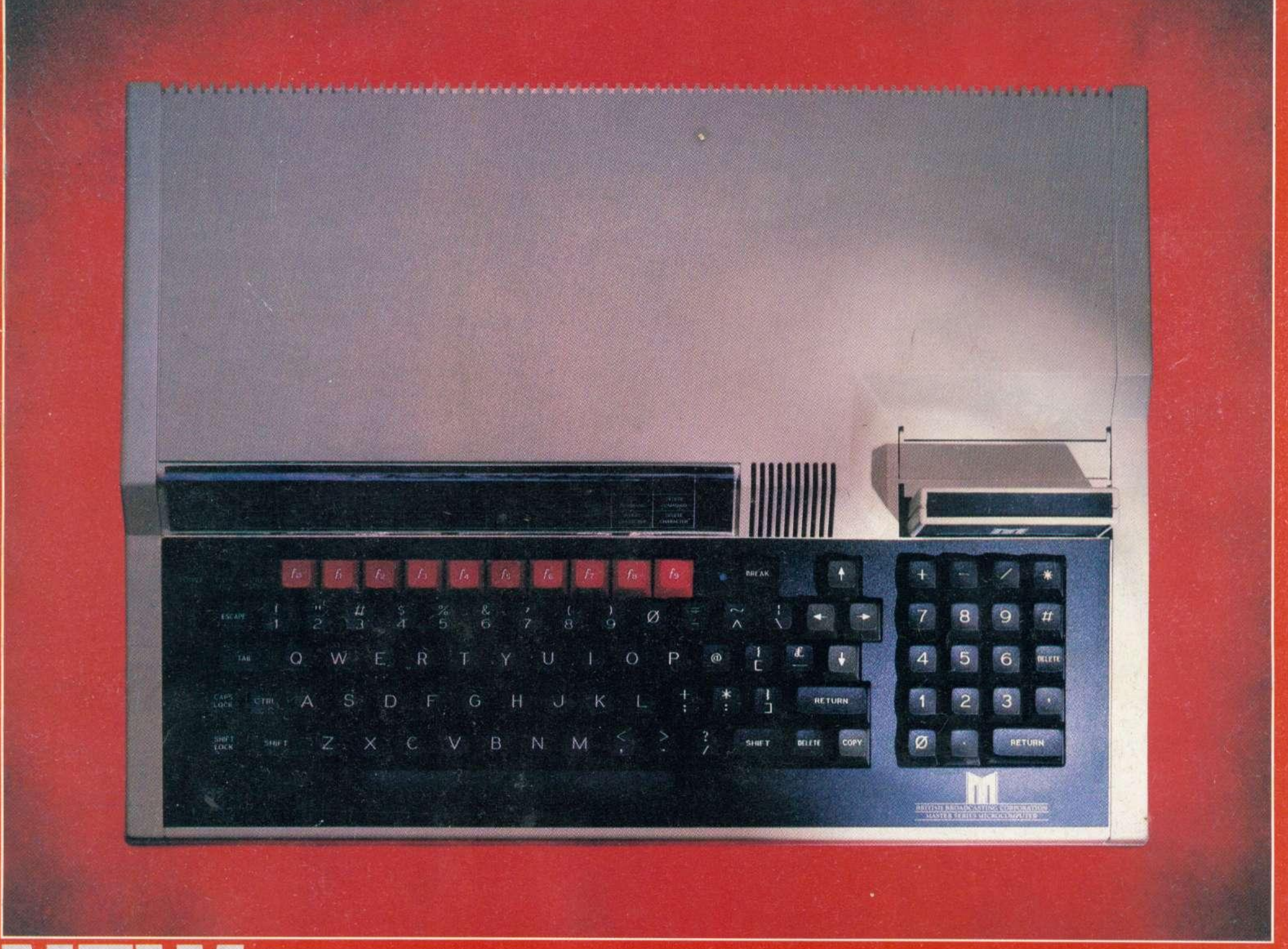
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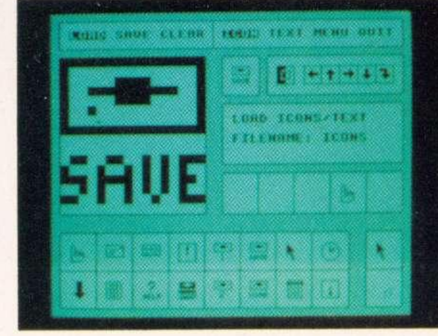
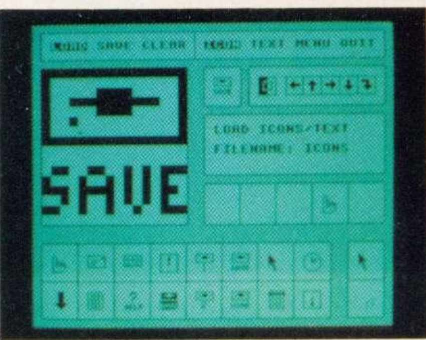
FEBRUARY 1986

EXCLUSIVE



NEW BBC MICRO

ICON MASTER — Icon Control System

GIVE YOUR PROGRAMS THAT PROFESSIONAL TOUCH

This pack automates the creation of an icon-driven user interface. It is supplied on a 16K Rom and allows you to design a screen containing icons and then use it in your own programs, in place of a normal menu.

It is easy to use and may optionally be controlled with the AMX mouse. Icons (sample sets provided) are designed on a special Icon screen editor and are compatible with AMX icons.

Having designed the icons, the next step is to select the Menu editor and design your final screen. You may position your icons and text wherever you choose on the screen. Icon Master then generates the code to append to your Basic program which will reproduce your icon screen and handle user input.

Your own icon-driven programs may be used with or without the Icon Master Rom in your machine.



ROMIT — Put your own Basic programs into Rom



CREATE YOUR OWN SILICON DISC

RomIt is a 16K Rom which adds a new feature to your BBC Micro — A Ram Filing System. This provides over 20 new commands which enable you to:

1. Create a silicon disc with its own filing system commands. Type ★RAM, then you can catalogue the 'disc', save and load files to it, storing as many files as memory will allow. You will need sideways Ram to use this facility.

2. Put your own Basic or assembler programs (or any file) into Ram and then make them into Eproms. Whether it's your favourite game, your function key definitions or any program that you use frequently, you can now put it into Eprom so that it's always instantly available.

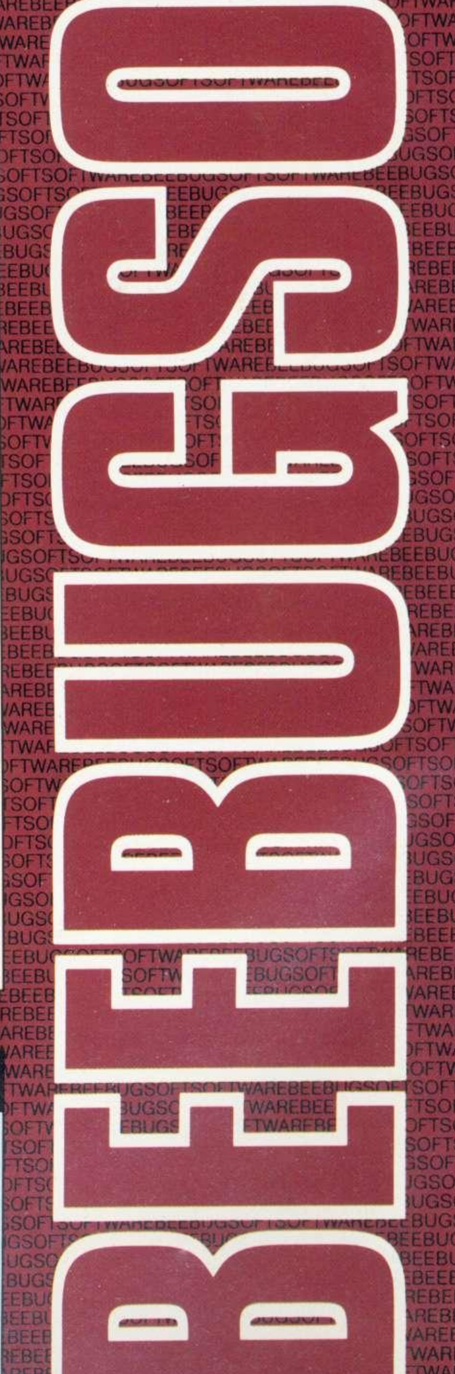
Your Eproms will work with or without the RomIt chip in your machine, and so you may pass on copies of your programs to other people.

Getting your own Basic program into Rom couldn't be simpler. Just load your program into memory and type: **★RAM ★TRANSFER "prog" ★DOWNLOAD** and either connect it to a blower, or send the disc (or tape) to us, together with your RomIt registration number, and we will Rom it for you. (There is a small charge for this service).

3. Use your sideways Ram as a printer buffer so that you can continue to use your computer for other work at the same time as printing long documents.

Over 20 new ★commands are provided by RomIt

To get the most from RomIt you will need sideways Ram fitted to your computer, eg just a single Ram chip plugged into your ATPL (or other) Rom board.



ICONMASTER £34.00 ROMIT £34.00 inc. VAT

Available from your local dealer. **Supplied on 16K Rom.**

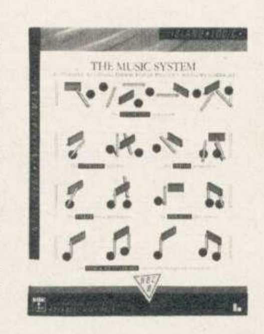
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We would like to apologise to any reader who found the punk advertisements offensive

All we wanted to do was to attract your attention to the most advanced micro based music program for the BBC microcomputer. We did not wish you to miss out on the amazing facilities provided in The Music System for creating, editing, playing and printing tunes. We tried to indicate how simple the program is to operate despite its unrivalled versatility and performance. (By the way, its editing facilities are akin to a word processor and the sound designer module is quite out of this world). Since there is no excuse left not to buy The Music System spend some of your Christmas money and buy one.



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ACORNUSER

ISSUE No 43 FEBRUARY 1986

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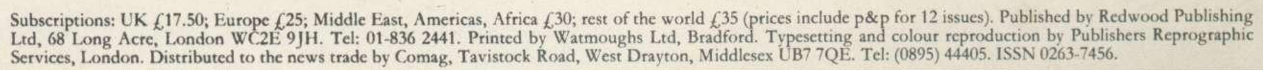
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EXCLUSIVE
NEW BBC micro

The Master, Acorn's new BBC micro, is launched this month. Internal second processors giving 16 and 32-bit computing are a major feature. Details on pages 7, 10, 11 and 17

FEATURES

COVER



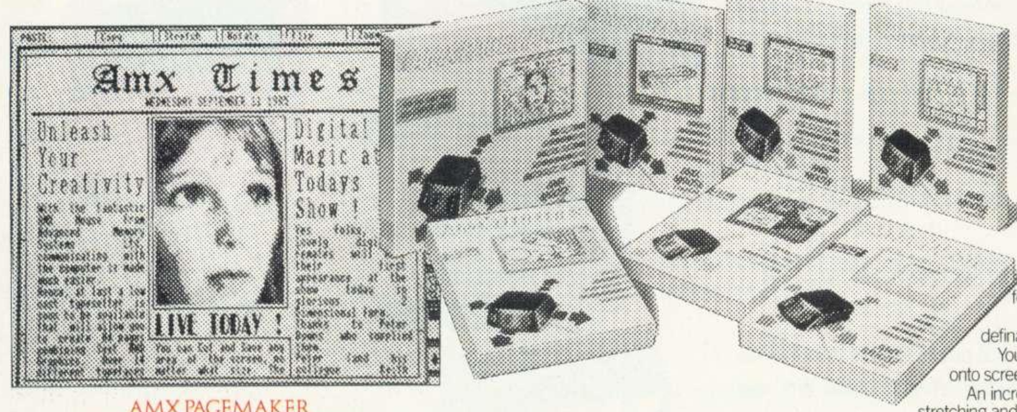
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NEXT MONTH

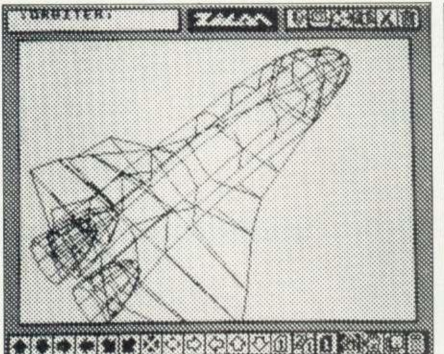
ACORN'S NEW MASTER
what it can do
Learn about music on the BBC micro and Electron
Gaining extra program memory from sideways RAM
Speech systems reviewed
News of a super music competition
Chris Drage and Nick Evans look at adventures and authoring languages

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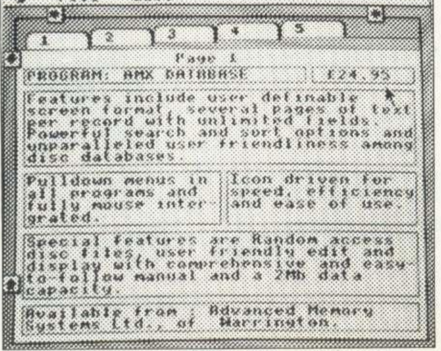
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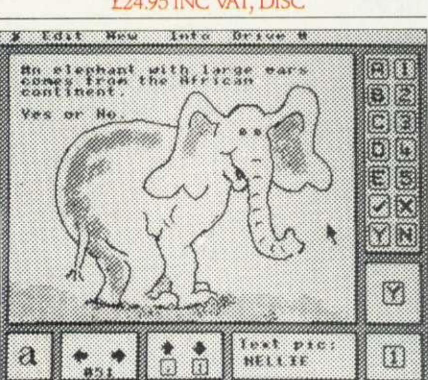
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£49.95 INC VAT, 2 ROMS + DISC



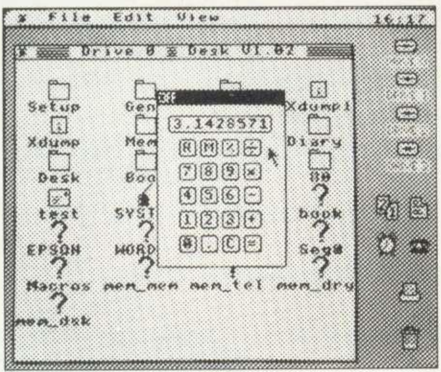
AMX 3D ZICON
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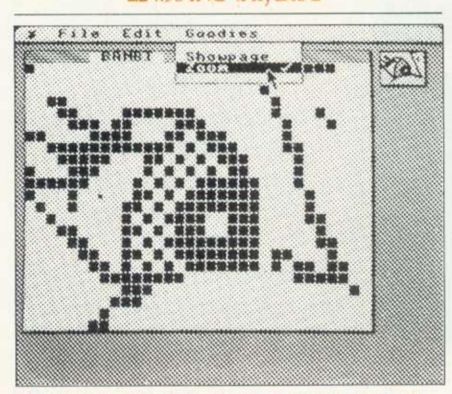
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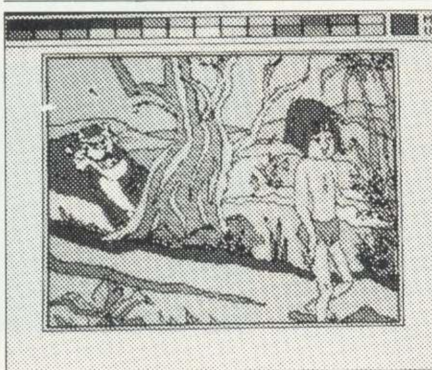
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AMX DESK
£24.95 INC VAT, DISC



THE ORIGINAL AMX ART PLUS UTILITIES
£14.95 INC VAT, DISC



AMX PAINT POT
£14.95 INC VAT, DISC

From Advanced Memory Systems comes an irresistable selection of Icon driven software that AMX Mouse, ROM and AMX Super ROM owners can really get their teeth into!

Seven incredible programs, so comprehensive, they will more than satisfy even the most demanding BBC Micro user and when coupled with the AMX Mouse will broaden the horizons of the BBC Micro to new, undreamed of standards of sophistication.

AMX PAGEMAKER.

A fantastic high resolution A4 Typesetting and Artwork system.

Comprising 2 ROMS (8K and 16K) 'Pagemaker' features a fast scrolling A4 page.

There is a wide selection of typefaces and user definable fonts.

You can load in Wordwise and View files or type directly onto screen.

An incredible 'Cut and Paste' facility includes copying, rotating, stretching and zooming.

For the professional touch there is N L Q high quality dump, and you can dump any part of, or full A4 page.

AMX 3D ZICON.

Now, with a 3D ZICON you can transform three dimensional vector data and translate them into on-screen graphics.

You can Print or Plot graphics to suitable peripherals and produce output suitable for other AMX programs such as ART – UTILITIES and Paintpot.

There is even the facility to sketch in two dimensions and convert to three dimensions and auto swaps generator.

Some interesting example objects on file include – helicopter – jet plane and dodecahedrom.

AMX DATABASE.

Database is a brand new super filing program featuring 1000 records and unlimited fields per record.

It has a powerful search and sort facility and user friendly edit and display.

In fact it is probably the most advanced user friendly database available today.

Special features include: User definable screen format for record display – random access files – super fast sort – flexible printer dump and screen display.

AMX XAM.

A brand new and exciting educational program with maximum flexibility, allowing a multitude of options and variations.

With XAM you can create a multiple choice exam which would not be alterable by the examinee.

And you can incorporate within the questions, your own pictures, created on AMX ART, building the finished picture into the quiz and providing an extra and fascinating aspect to the examination.

AMX DESK.

The complete home or office acquisition.

You will wonder how you ever managed without AMX Desk.

Just point your Mouse and select the following additional aids:

MEMO-PAD for up to three pages of text
TELEPHONE/ADDRESS BOOK with 200 or 400 scrolling entries
DIARY with three months calender
ALARM to remind you about appointments
CALCULATOR – Yes! A full function calculator that cannot be lost or suffer flat batteries, and any window can be dumped to your printer at the touch of a button.

THE ORIGINAL AMX ART PLUS UTILITIES.

Now available as a single package – two of AMX's most popular programs.

AMX ART is a superb mode 4 graphics program, making full use of windows, icons, menus and pointers, it allows you to create your own pictures and the host of graphic features in AMX UTILITIES including a fantastic zoom facility for accurate amendments to your ART pictures – one dot becomes a character.

You can also move, copy, rotate, reflect, enhance circles, draw ellipses and arcs, even print icons.

Border can be added and pictures stripped and centred for saving and printing. All pictures can be loaded into AMX PAGEMAKER, AMX 3D ZICON, AMX XAM, AMX PAINT POT, and AMX SUPER ART.

AMX PAINT POT.

The pictures you have created with AMX ART and enhanced with AMX Utilities can now be coloured in, using PAINT POT.

They will burst into life with rich, vibrant colours, and with a palette of 256 different shades you should not be short of inspiration.

You can even store up to 20 Illustrations in Picture Show mode, then display them in sequence.

To start you off we have included eight exciting pictures in the program.



IMAGINATION AT YOUR FINGERTIPS.

BOTH THESE EXCITING PACKAGES ALONG WITH OUR SUPERB RANGE OF AMX ROM AND SUPER ROM COMPATIBLE SOFTWARE ARE AVAILABLE FROM ALL GOOD COMPUTER DEALERS OR BY SENDING CHEQUE OR P.O. TO FREEPOST ADVANCED MEMORY SYSTEMS LTD., 166-170 WILDERSPOOL CAUSEWAY, WARRINGTON, WA4 6QA.
FOR INSTANT ACCESS OR VISA ORDERS, RING (0925) 413501

We thought it was about time we put you in the picture.



When we introduced our AMX Mouse to BBC Micro users, the response was phenomenal.

And no wonder!

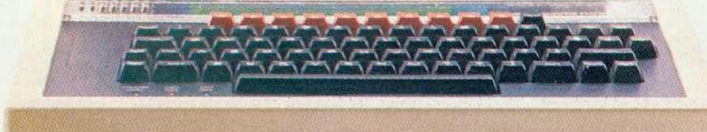
It was regarded as 'pushing the BBC to its limits' and hailed by the press as 'probably the best input device that has appeared recently'. The AMX Mouse brought to BBC Micro users the same sophisticated, positive control that had, until then, been the province of the more expensive computers, like the Macintosh.

Now we announce a new enhanced software package which, can be used with a traditional keyboard or joystick but truly comes into its own when used with the AMX Mouse.

AMX Super ROM and Super Art adds colour to the features of the original AMX ROM, on a new 16K ROM.

It dramatically extends the original AMX ROM facilities to include Pull Down Menus, over lapping colour windows, colour patterns and an extended Icon set in all graphic modes.

Specially written to be usable with the vast majority of BBC Systems including 2nd processors, the Aries RAM Board, the BBC + Shadow mode, tape, DFS and ADFS.



The kernel of the Super Art program is included in the 16K ROM, providing tape and disc users with a Mode 1 colour drawing program.

But Super Art really comes into its own when used on a disc based system; a host of additional facilities can be selected direct from the screen.

Colour pictures can be created in dot resolution up to A4 size by scrolling the screen window, over the picture.

Other facilities include colour pattern editing – use of icons, additional text styles, various copy facilities and a superb colour Zoom.



Pictures can be printed out in colour (Integrex) or shades of black and grey on Epson compatible printers.

The results can be astonishing! – you can even store your finished 'masterpieces'.

The AMX Icon Designer facility gives you further freedom to design and store your own custom icons for use in your own programs.

This fabulous new package costs only £89.95 – a price as remarkable as the package itself – and includes a fully illustrated operating manual.

If, however, you are afraid of mice, you can purchase just the software package plus the 16K Super ROM for just £49.95.

You will still achieve some pretty remarkable results using your keyboard or joystick – not nearly as good as with the Mouse of course – but you can always add one later on for just £40.

Then you'll really be 'in the picture'.



FOR INSTANT ACCESS OR VISA ORDERS, RING (0925) 602959/602690.


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NEWS

Master: the new BBC

Acorn has revealed the Master, its new micro to bear the BBC name for the next three years which should be in the shops by February. Unlike the original BBC micro this is a range of five machines costing £399 up to £1600. The Master has a similar design to the BBC, but has a larger case and a 'hump' to take second processors.

The BBC Master 128 is the standard micro. It costs £499 and is powered by an improved version of the 6502 processor chip – very much a BBC B+128 in new clothes. But the list of standard features includes battery-backed memory, Electron-style cartridge slots, separate numeric keypad, two disc filing systems, *View* and *ViewSheet*, and expansion slots for processors and hardware inside the case.



Master series: five micros to carry the BBC name with 8,16 and 32 bit second processor options

First on the expansion path is the Turbo, as above but with a second 65C102 processor giving a claimed speed increase of 66 per cent, with 44k usable memory. The upgrade costs £99.

Then there is the Master 512, based around the 16-bit 80186 chip with 512k of user memory and Gem, the icon-based, mouse controlled operating system featured on the IBM PC, Atari 520ST and never-released Acorn ABC210.

The 512 is unlikely to see the light of day until after Easter and is expected to cost about £1000. This includes mouse and associated software for wordprocessor, graphics, desk diary and calculator. This comes from Digital Research, and so is compatible with software written for other computers, such as those from IBM, running MS DOS and concurrent DOS operating systems.

For number-crunching power there's the Master Scientific, at the heart of which is the 32-bit 32016 processor. This comes with four languages and 512k of RAM. Projected cost is estimated to be around £1500.

An Econet-only version of the Master, called ET, comes in at £399 and is aimed at schools. Also the Master 128 qualifies for discounts under the government software scheme, which means £105 off.

Compatibility is still the byword at Acorn and programs which work on the B+ should carry over to the Master.

More on pages 10, 11 and 17.

Wordprocessor for integrated range

Computer Concepts is set to release *Inter Word*, the word-processor part of its integrated software range. Charles Moir, managing director of the company explained: 'We've done it the *Wordwise* way and now we will do it the *View* way with a WYSIWYG screen format so that you get what you see on the screen when you print it out.'

It will cost £59.35 inclusive and offers the ability to read files from one Inter product into another.

School banking on the Beeb

The Trustee Savings Bank brings school banking into the electronic age, with a software package for the BBC micro.

The TSB has long been catching them young with its manual school banking scheme, which is operated for and by schoolchildren in lunchtimes. Now the TSB computer program handles the hard work of book-keeping.

The software was written by a teacher and is available free of charge to schools providing they open a TSB account.

The TSB has also become a major sponsor of the Times Network, the electronic mail system just for schools. Sixty pages will be put on the network, offering money management advice, descriptions of job opportunities in banking and information on TSB-sponsored wildlife, music and sports schemes.

For further information contact: TSB England and Wales, PO Box 99, St Mary's Court, 100 Lower Thames Street, London EC3 6AQ.

YOU'LL FIND OUR COLOUR MONITOR QUITE A CONTRAST

If you're looking for a high resolution colour monitor for your BBC micro, this special Mitsubishi offering from Opus Supplies could be just the contrast you've been waiting for. It's been designed to provide the crispest display no matter how variable the light or shade available. Unlike most high resolution colour monitors the Mitsubishi features both brightness and contrast controls which together with its anti-glare screen ensure a perfect, pin-sharp picture for both character and graphic displays in even the most demanding conditions.

The 14" Mitsubishi high resolution colour monitor offers astonishing clarity with 640 pixels permitting a full 2,000 character display in 8 colours. Its advanced video and deflection circuits guarantee stable, clear and brilliant images without distortion.

As you'd expect our monitor is both stylish and practical with a three-position adjustable support stand to provide the optimum viewing angle.

Our price of just **£249.95 + VAT** is inclusive of all connection leads, free ex stock delivery and a full 12-month warranty. The Mitsubishi colour monitor is suitable for use with the BBC, Electron, Amstrad, Commodore and most leading micros. Ring us now on **0737-65080** for details of your nearest dealer or simply post the coupon.
Unbeatable dealer, education and government discounts available on request.

FEATURES

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To: Opus Supplies Ltd,
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I enclose a cheque for £________ or please debit my credit card account with the amount of £________

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My computer is________

Name________

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News in brief

● *Acorn User* will be exhibiting at the Hi-Technology and Computers in Education Exhibition at the London Barbican Exhibition Halls on January 22-25. The show is free to teachers.

Staff from the magazine will be found on the ground floor of Hall B at stand 44. Entrance to the halls is from Golden Lane, London EC1. Details from Timothy Collins on 01-349 4667.

● The success of BBC micros in running a viewdata service covering local elections right through the night has prompted Cambridgeshire County Council to put computers with local information in its libraries.

Eighty pages of viewdata information have been committed to a BBC micro floppy disc, including details of education, library, police and social services. Copies of the disc, which was produced using the *Edfax* package, are sent to schools and libraries for display.

There are also plans for an online telephone-based viewdata system for local what's on information. You can write for a copy – 40 or 80 track format – to The Research and Information Unit, PO Box 1, Cambridge. Readers outside the country should include the cost of postage.

● BBC micros are helping blind and partially sighted people to overcome the hurdle of the printed word. At Birmingham University's Research Centre for the Education of the Visually Handicapped, a touch screen for the Beeb has been developed to allow partially sighted children to differentiate between geometric shapes.

The centre has also developed a talking *Wordwise* program which will work with several text-to-speech synthesiser systems. A generalised version of the program will work with other BBC micro wordprocessors.

The Acorn Teletext adaptor is used to allow pages from Ceefax and Oracle to be dumped out as Braille or in large print on a printer. The research centre can be contacted on 021-471 1303.

Beebs lead news print technology

BBC micros were at the forefront of newspaper technology at the recent Newstec exhibition in Brighton, organised by the Newspaper Society.

Two Beebs acted as direct input terminals for journalists to produce seven editions of the daily exhibition newspaper shown opposite – more than 100,000 papers. Behind the micros were minicomputers, picture scanning equipment, and a colour printing press worth £2 million.

Each paper had eight pages, half of them in colour, with four of these devoted to news which changed with each edition.

Three journalists from the *Kent Messenger* wrote all the stories and typesetting consultant Mike Barnes put the system together.


THE NEWSPAPER SOCIETY

newstec news '85

November 25, 1985

YOU'RE WELCOME

THE Newspaper Society today launches its £1 million exhibition of the latest in newspaper high technology.

by Peter Bishop

Newspaper Society president Robbie Thomas opens the exhibition.

Plates deal with Eddy

Mirror Sogat talks

BBC micros were used as input terminals to produce this daily newspaper

The BBC micros were all fitted with the *View* wordprocessor and used other software developed by Redwood Publishing, the publishers of *Acorn User*.

Eddy Shah, who is at present turning the national newspaper world upside down with plans to launch a new daily based around modern technology, was at the Newstec exhibition to set the presses rolling.

Radio show in fight for cash

by Geoff Nairn

Radio producer Tim Lyons believes in going straight to the top. After months of delay, a frustrated Tim has written to John Butcher, head of the Department of Trade and Industry (DTI), for help in launching his computer show, *Datarama*, nationwide.

Datarama has been a great success in the Bristol area on Radio West, and Tim, the show's producer, approached other independent local radio stations to see if they wanted to broadcast it.

The response was enthusiastic and *Datarama* was to be networked last autumn, but the slump in the home computer market scared off the necessary commercial sponsors.

The letter to Butcher is a last-ditch attempt to revitalise the idea of a nationwide commercial radio show for computer users. Tim said: 'The Department of Trade and Industry talks a lot about how important information technology is to the country. I wanted to see if they could help'.

The DTI replied, saying that it was sympathetic and inviting him to discuss his problems with the department.

Tim said: 'Whether they can actually do anything practical is another matter.

'There's a wonderful opportunity going begging and the danger is that the other local radio stations are wondering if the show will ever be produced'.

As *AU* went to press, Tim's meeting with the DTI had yet to happen. We will keep you informed . . .

Acorn moves out of US

Acorn has finally thrown in the towel in its attempt to conquer the US market and has sold off its remaining stocks of American BBC micros.

In a deal said to be worth $1.25 million Acorn has sold an unspecified number of machines, peripherals and components to a Texas company, Basic, which will take on the supply and support of the US market.

Basic is a subsidiary of the Mexican company Datum, which has been selling locally-assembled Beebs, with modified Spanish keyboards, to South America for three years. As part of the deal Datum will now manufacture 7000-8000 BBC micros a year for the Spanish-speaking markets in both North and South America.

Acorn's sales office in Woburn, Massachusetts is being closed down after a £2 million loss was reported on Acorn's American operations last year.

Private RAM and 50 bytes make all the difference

Two developments put the Master well ahead of the B+ in the memory stakes – 'private RAM' for ROMs and 50 bytes which are stored even when the micro is turned off.

Starting with the minimum 128k, the memory map for the Master is as shown in figure 1. As with the B+128k, 64k is given over to four banks of 16k sideways RAM pages. Similarly, BAS128 may be run and can use this as a full 64k for Basic programs. Of the remaining 64k, 32k is used in standard fashion, ie from &0000 to &7FFF. 20k is mapped as a shadow screen, again like a B+, from &3000 to &7FFF.

The really exciting change is with the remaining 12k. This 'private RAM' is mapped in two sections from &8000 to &8FFF and &C000 to &DFFF, and is used by the MOS and ROMs such as DFS and ADFS as workspace. This means that PAGE is set to &E00 by default at all times.

Also included here is a fully-exploded character font and a function key buffer allowing strings to be up to 1k long.

The private RAM is mapped as:
&8000-&83FF – Soft key buffer
&8400-&87FF – VDU workspace
&8800-&88FF – VDU variables
&8900-&8FFF – Exploded character font
&C000-&DCFF – Paged ROM workspace
&DD00-&DFFF – MOS memory
The old function key and soft key buffers are now employed as Econet workspace.

A further 50 bytes of RAM are provided within the battery backed clock. Co-processors (internal second processors) are mapped as on the BBC micro.

The MOS is much extended and flows over into the sideways ROM banks. Another 3k is held in the big 128k ROM on top of *View*, which is 13k long.

Inside the Master box

At first sight the Master looks different. The new case holds the standard keyboard, a full 18-key numeric keypad and, sitting proud of this, two Electron-Plus 1 compatible cartridge sockets. Altogether a very professional unit.

A glance at the memory map might may fool you into believing it was only a dressed-up BBC B+ 128k machine – but you'd be wrong – the 128k is much better used and the options are very impressive.

A 12k bank of private RAM prevents ROMs having to gobble memory; permanently-exploded character fonts and a 1k function key buffer ensure that PAGE is always set to &E00 as with a standard tape machine – no more downloading problems. Even more impressive are the 50 bytes of battery-backed RAM which allow you to configure 22 start up options such as whether shadow RAM or Tube are on; the language selected, etc. These bytes sit alongside a real time clock.

Landmarks

Now take the lid off and you're in a different world. Familiar landmarks such as the video ULA have been replaced by customised gate array chips; gone are the plugs and sockets are scattered around the old boards. It's impressive and simple upgrading is just a matter of plugging the relevant board into position.

Challenging for pride of place comes the 'one megabit ROM' as Acorn calls it – a 128k ROM packed with firmware. This includes a much extended 35k machine operating system, an improved version of Basic, Basic 4, *View*, *Viewsheet*, Edit – versatile program and text editor, DFS 2.2 and ADFS.

The MOS is jam-packed with goodies including graphics routines similar to those available in the *Graphics Extension* ROM (reviewed in the December 1985 issue). Three ROM sockets are provided, though the minimum chip size is 16k. Acorn is also providing an EPROM cartridge to take existing firmware.

Co-processors

Internal second processors – called co-processors – may be installed by simply plugging them in – see page 11 for details. Software compatibility is catered for with a Shift-Z-Break option to emulate the 8271 disc controller chip on the BBC B. Compatibility problems may arise with software and ROMs that perform illegal operations such as writing to the user definable character buffer which has been moved.

All in all Acorn seems to have hit the nail on the head with the Master, which certainly looks set for a rosy future.

Next month's issue will contain a full and detailed review of this fascinating new machine. Remember where you read it first!

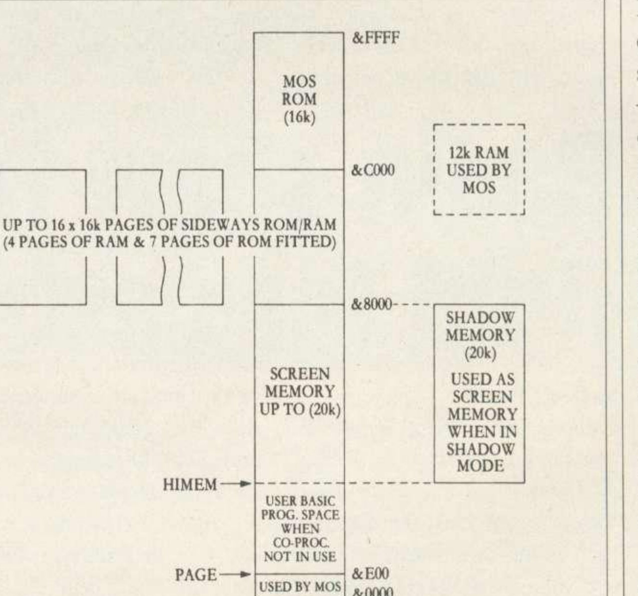


Figure 1. The memory map of the Master's minimum 128k memory

'Mega ROM' holds seven Beeb chips

Supplied with the Master 128 in a single 128k ROM comes a 35k MOS (see page 17), Basic 4 (as in the Workstation), Edit, *View* 3.0, *Viewsheet*, 1770 DFS and ADFS.

Both Basic and MOS have been re-written to take full advantage of the increased number of operations provided by the 65C02.

Basic 4 contains many changes and improvements. In brief these include a LIST IF option that may take forms such as:
LIST IF DEF
LIST 10,100 IF
LIST IF A%
TIME$ allows access to the real time clock. The assembler has been extended to incorporate the new instruction set. A full list of the changes will appear in next month's issue.

Edit is a versatile text editor for use in preparation of programs or text and will be a boon to programmers. It automatically transfers programs to and from Basic.

View is version 3.0 but contains a time-stamping command that will date and time letters as they are printed.

Viewsheet, 1770 DFS and ADFS are as available on the B/B+.


Master 128 with lid off: note break key guard and RAM battery by cartridge slots


Turbo exposed: co-processor board with 65C102 to left and Econet top right

Plug-in boards boost power

The Master 128 is the foundation of the new BBC range. By simply plugging second processors inside the case (now called co-processors) instant upgrades can be accomplished. The external Tube is still fitted, so another second processor such as a Z80 may be added as well.

Turbo is the first in a series of co-processors. This is based around the fast-running 65C102 processor; at 4MHz it effectively doubles the processing speed of the machine. All eight *PCW* benchmarks are completed in a staggering 13.55 seconds. Once inserted the standard Master 128 becomes the input/output processor, with the Turbo's board supplying 64k of RAM (as in the BBC 6502 second processor) with 44k available in *View* or for programs. The Master Turbo is well suited as an Econet fileserver.

Econet

The Master Econet Terminal is similar to the 128 but with less firmware. Disc upgrades, although physically possible, will not be supported by Acorn. The Advanced Network Filing System (ANFS) is supplied with the machine which will run the icon-based Econet user front end.

Co-processors may be fitted to the Econet Terminal, making it upgradeable to Turbo, 512 and Scientific capabilities.

The recent announcement of the licensing of Acornsoft firmware means that ROM images can be downloaded from the fileserver into any of the sideways RAM banks for instant use.

Upgrading any Master series computer to Econet simply requires the insertion of a small board and the ANFS ROM.

The Master 512 provides half a megabyte of memory centred around the 16-bit processor 80186. It comes bundled with both Gem and the Gem Collection from Digital Research. To take advantage of the icon driven software, which includes *Gem Desk Top*, *Gem Write* and *Gem Paint*, a mouse is provided.

Most significantly, Gem runs under DOS+ which is compatible with both MS-DOS and CP/M 86. Educational establishments will no doubt be pleased about the former. An optional upgrade can provide Digital Research's concurrent DOS4.1 – a multitasking operating system.

At present Gem will not support networking but Acorn envisages use of Econet with DR-NET or MS-NET. No firm time scales are available on this.

Compatibility

Acorn does not claim IBM PC compatibility for the 512 but it should be capable of running software such as *Wordstar* which does not rely on specific IBM hardware.

Finally, there's the Master Scientific based on the 32016 chip with 0.5 Mb of RAM. A subset of the Panos/Pandora operating system supplied on the Acorn Workstation and a feast of software is provided on disc. This includes Fortran 77, ISO Pascal and C. These are full implementations and conform to the relevant standards. An IEEE standard floating point support processor is an optional extra.

In most cases programs developed on the Master SC will run unchanged on a mainframe.

	Master 218(ET)*	Turbo upgrade	512 upgrade	Sc upgrade
Processor (CPU)	65C12	65C102	80186	32016
Bit size of CPU	8 bits	8 bits	16 bits	32 bits
CPU speed	2MHz	4MHz	8MHz	8MHz
RAM	64+64k	64k	512k	512k
Battery RAM	50 bytes	–	–	–
ROM supplied	128k (64k)	4k	–	16k
ROM capacity	256k	–	256k	64k
Disc interface	Yes (No)	–	–	–
Network	Optional (Yes)	–	–	–
Firmware	35k MOS, Basic, Edit(–), View(–), Viewsheet(–), DFS(–), ADFS(ANFS)	Tube	Tube	Tube, Pandora
Software	Welcome disc, BAS128, ADFS utilities	Hi-Basic, Hi-Edit, Printer buffer	DOS+, CP/M86, GEM Desk, Paint, Write; BBC Basic	Panos, C, Fortran, Pascal, BBC Basic, macro assembler,library
Inclusive price	£499 (£399)	£99	£500 approx	£1100 approx

**Master Econet Terminal (ET) shown in brackets*

Table 1. Master range with prices of upgrade kits to Master 128 and specification guide

Now we speak

Français Ελληνικος

The KBL128PC is remarkably fluent in languages – not only in BBC English, but in its choice of operating systems. If you think in French, Arabic or Greek, the KBL can be supplied with a keyboard for either language.

The KBL is fully compatible with all Acornsoft, giving access to a vast number of software programs – you're almost spoilt for choice.

The whole system comes direct from the manufacturer with a Hi Res Monochrome Monitor, Infra-Red Remote Keyboard, the powerful 128K KBL Computer and the superb Epson Printer. LX80 with NLQ.

If we are talking the right kind of language, you'll be more than impressed by the software supplied at no extra charge.

But to really spell out what a marvellous offer this is, the complete system is available for only £1460 + VAT.



High Resolution Monitor

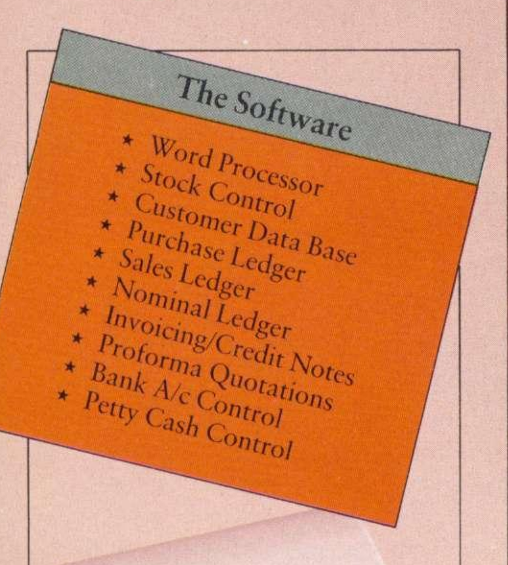
We could write a book, but if you are looking for a powerful business system, at the manufacturers price, then the KBL128PC speaks for itself – in any language.

The Hardware

- 128K Ram Computer
- Acorn ADFS Fitted Standard
- Full QUERTY keyboard with numeric keypad
- 1.4 MByte Disk Drives
- 80mm Cooling Fan Fitted
- Hi-Res Monochrome Monitor (colour option available)

your language...

عَرَبيّ English





Pear Tree Computers Ltd
Falcon House, High Street, Huntingdon, Cambs PE18 6SS
Telephone 0480 50595

I am interested in the KBL128PC System.

Please send me further details. I would be interested in the following Operating System – Please tick

French ☐ Greek ☐ Arabic ☐ English ☐

Name ______

Position ______

Company ______

Address ______

______

______

AU-MS1

PEARTREE COMPUTERS LIMITED

THE COMPLETE SUITE
for the BBC Microcomputer

INTER-SHEET
INTER-CHART
INTER-WORD*
INTER-BASE*

The most comprehensive range of integrated ROMs for _any_ microcomputer

*available soon!



Computer Concepts



Gaddesden Place, Hemel Hempstead, Herts HP2 6EX
Telephone: Hemel Hempstead (0442) 63933



HELP US TO HELP YOU

The *Acorn User* Reader Services offer which we kicked off in October has proved a huge success – so much so that we have been inundated with enquiries. This article is to help us help you so that we can give you a better answer and even more value for your money. However, we have had to increase the reply time to 10 working days because of contacting hardware suppliers, etc.

Acorn User strongly recommends readers who are new to home computing, and even the old hands, to join their local computer club – you will probably find answers to many of your questions there. Your library should have details of your local club.

The enquiries we are getting fall into three main categories: hardware, software and add-ons.

Dealing with hardware problems is difficult, in fact without the necessary test equipment it is often impossible to give an answer. We can suggest tests but it is likely that we will recommend that you take your micro to an Acorn approved dealer who has the correct equipment to perform hardware diagnostics, and can actually lay hands on the equipment.

Software is more straightforward, but we need to try it for ourselves, so send in a disc and any listings, etc. Please give as much information about your program as possible by writing comments next to the listing or on a separate sheet of paper.

Finally add-ons. Problems are often uncomplicated, but once again we must have details of all your kit.

Many enquiries come in containing up to 10 questions, but £2 does not go far and a single problem can take 30 minutes to solve. Of course you are free to ask as many questions as you wish, but you must send £2 per question otherwise only the first one will be answered.

When you write to Reader Services please provide as much information as possible, clearly and concisely.

First, print a list of all your equipment. This example shows a typical information sheet:

Name:	Orson Fact
Address:	Sleuth Cottages Detective Drive Hidden Sherlockshire
Telephone:	(0999) 1234 (home) (0999) 1212 (work)
Equipment:	BBC B+ 128 OS 1.2 Watford DFS 1.4 ADFS Network
Internal extras:	Solidisk modem Watford ROM Board
ROMs:	Graphics Extension 1.2 Basic Editor 1.2 View 3.0 Disc Doctor Novocad
Peripherals:	10 Mb Winchester Hard Disc Colour Monitor Technomatic Dual 80/40 Drives Star SD10 Printer 6502 2nd processor
Other details:	Issue 10 board, 2 months old Other equipment, 18 months old but previously used okay on BBC B. Purchased at Bloggs Computers, London.

Such a list makes it possible for us to see at a glance just what you have. It's surprising how many readers don't give any details about their set-up.

The next thing we need to know are the details of your problems. Use a separate sheet of paper and print the details neatly, noting points such as: the problem itself, how long it has been happening, what started it off (if known), any remedies you have tried, any other information.

In the case of software, a disc (preferably) or tape ***must*** be included. If it is your own program, then a commented listing or well REMed program is essential.

With this information we can attempt to answer your enquiry quickly and efficiently and give you the speedy answer you want. Please allow at least 10 ***working*** days for your answer. Unfortunately we are unable to answer enquiries over the phone.

POST A PROBLEM

AS a result of pressure from readers, *Acorn User* now guarantees a fast reply service for enquiries. Your answer will be returned within 10 working days for just £2 (includes VAT), or your money back.

The idea is simple. Just write out your problem, fill in the coupon (right), and send both off to *Acorn User* with a stamped addressed envelope and cheque or postal order for £2. (If you want recorded delivery, add the cost of this on. The same goes for overseas readers.) Include as much detail as possible and a disc or cassette if a program is involved – with enough space to record any corrected listing.

We will then answer the problem and return all material received – within a guaranteed *10 working days* from receipt. If we fail to match this promise your cheque or postal order will be returned with the answered question. If we cannot answer the problem, the cheque will be sent back to you.

If you want a listing debugged, advice on hardware or software, or a list of addresses, send us your problems.

ACORN USER READER SERVICE
68 Long Acre, London WC2E 9JH

Name ....

Address ....

....

....

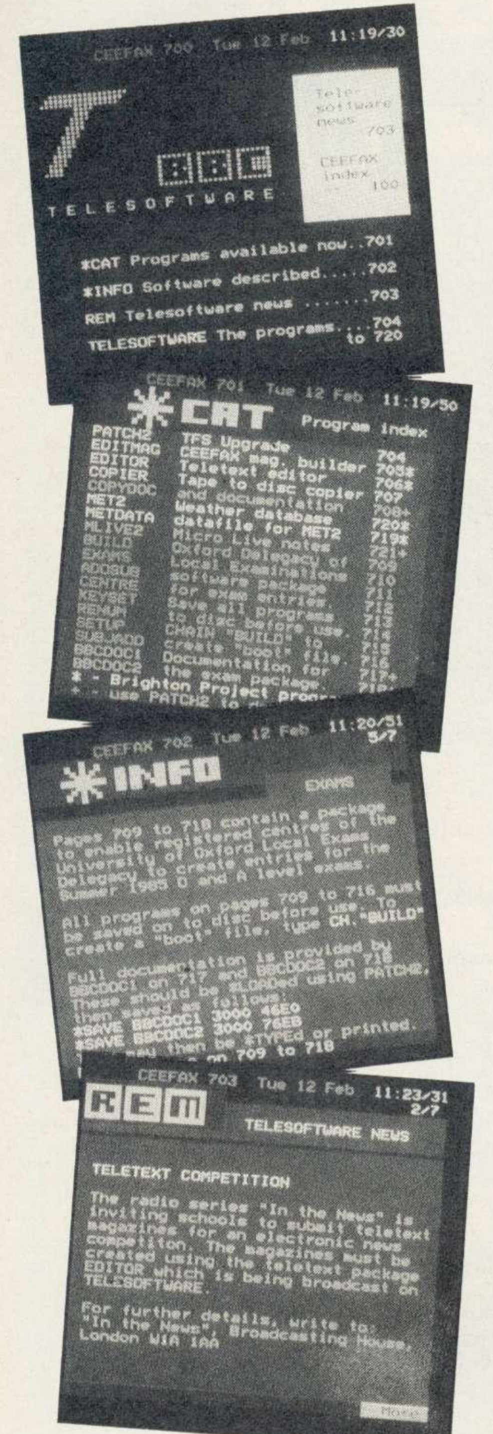
.... Postcode ....

Daytime phone number..

I enclose a cheque/postal order for £2 and an sae with my problem.

OFFICE USE ONLY Date in:
Date out:
Answered by:

MORLEY ELECTRONICS





FEATURES

- Advanced design uses the latest technology will handle ANY future enhancements to the Teletext system eg: full field: 8 bit data transfer: 2k pages etc.
- Simply plugs into user port and power output.
- Low power consumption, less than 200ma. Optional power supply available.
- User friendly menu driven software including extended OSCLI and Osword commands for access from BASIC programs.
- No user-RAM required (PAGE remains at default value).
- FREE Telesoftware, no access charges. (at present updated weekly.)
- Save selected pages to disc/tape for later retrieval.
- Full access to all Teletext services and channels eg: CEEFAX, ORACLE, 4-TEL.
- Software available on ROM or sideways RAM format disc.
- Basic 1 & OS1.0 compatible.
- Gives you a real-time clock at your disposal (*TIME).
- Free software upgrades to allow for any enhancements to the teletext service. Eg: extra channels, full field data on cable & satellite systems etc.
- Easy to follow comprehensive user guide.
- No hardware limitations, it can for example receive virtually unlimited numbers of channels.
- Works with Solidisc SWR.
- Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).

ELECTRON TELETEXT ADAPTER
Electron adapter now available, including emulated Mode 7 allowing you to run long Adventure type programs.

1 megabyte RAM disc configured as a drive. Should be available 2nd week of Jan. Please ring for details.

M/B software DESIGN 7
Easily the best value Mode 7 screen designer on the market today.
Design any mode 7 screen, from simple MENU pages to full CEEFAX standard. This program is an invaluable aid. Designs can be saved to disc as automaticaly numbered files or the program will convert the screen into a BASIC Proc.

INTERFACES DIRECTLY WITH ADAPTER allowing CEEFAX-ORACLE pages to be selected and dropped into editor screen for alteration, saving, or conversion to BASIC. Allows channel change from within program.

The Morley Teletext adapter introduces you to the world of Teletext at a price that wont break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than eight years ago, will be fully compatible with any future advances in the Teletext system.
With the Morley adapter you will get a unit that automatically tunes itself in to the required station (no more messing around with screwdrivers in the back of the case), a user friendly menu driven program available on rom or disc, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.

For technical details please ring Morley Electronics on Tyneside (091) 251 3883.

AA35A

To order please fill in and send order form to: **MORLEY ELECTRONICS, 1 MORLEY PLACE, SHIREMOOR, TYNESIDE NE27 0QS.**

Please send me.

Qty. ☐ Morley Teletext adapters	@ £74.45 inc. VAT & P&P.
Qty. ☐ Teletext software on Rom	@ £24.95 inc. VAT & P&P.
Qty. ☐ Teletext software on Disc	@ £23.95 inc. VAT & P&P.
Qty. ☐ M/B DESIGN7 screen designer	@ £8.95 inc. VAT & P&P.
Qty. ☐ Teletext utilities on Disc	@ £5.95 inc. VAT & P&P.
Qty. ☐ Optional PSU	@ £9.95 inc. VAT & P&P.

Please delete 40/80

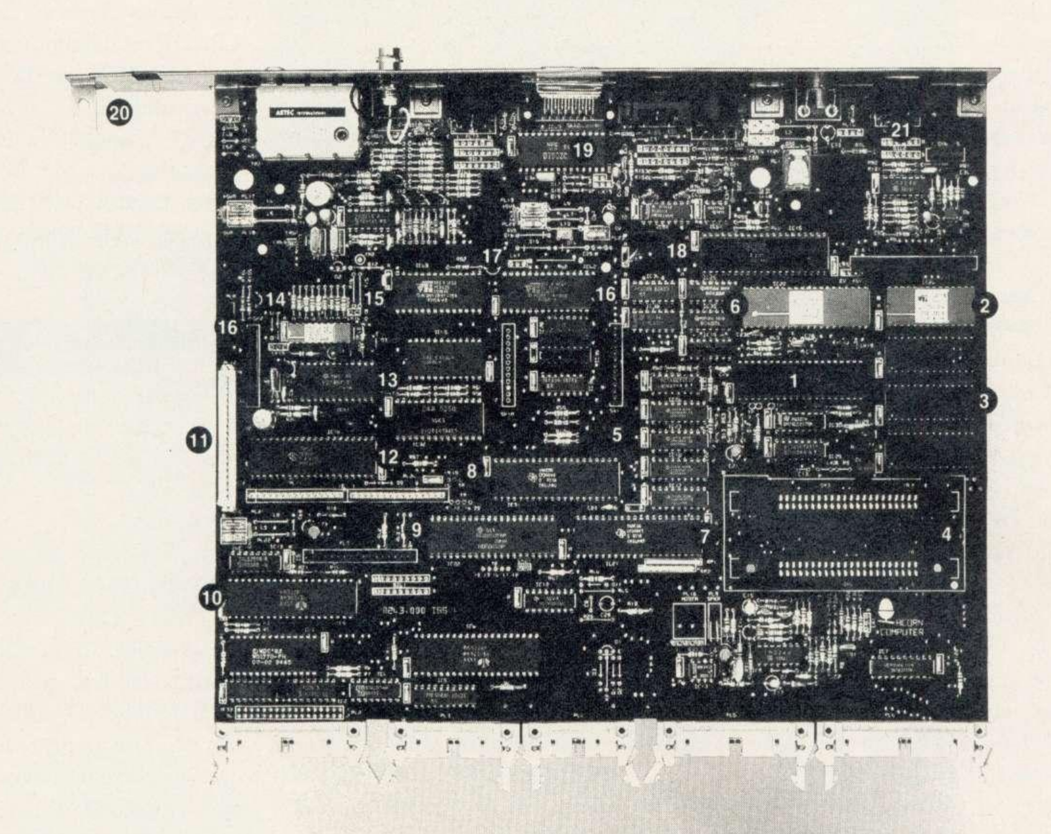
Total £

Access

NAME ____________ PHONE No. ____________ CHEQUE No. ____________

ADDRESS ____________

____________ POSTCODE ____________



Naked Master: this is how the machine's printed circuit board looks when removed. The sockets and interfaces are the same as on the BBC micro

New chips transform board

Although the Master is far more complex than the BBC micro, the board is much less cluttered. Acorn has incorporated much of the circuitry into its own customised chips – six in all. These also consume less power and are more reliable.

1: The 65C12 CPU – Running at 2MHz it will run standard 6502/6512 machine code programs. It is provided with a larger instruction set however.

2: 128k ROM chip containing the standard firmware. Called the 'megabit' ROM' or 'Mega ROM'.

3: ROM slots. Three are provided, from top to bottom these are 32k, 16k and 32k capacity. The two 32k sockets may be overlaid with sideways RAM.

4: Cartridge sockets. Two fitted as 32k each. Onward capacity of up to 256k each as EPROM technology permits. An EPROM cartridge is also available to allow existing firmware to be added – cost £10-£15.

5: 128k RAM. Installed as four, 64k by 4 bit DRAMs.

6: Memory controller. One of six customised Acorn CMOS gate array chips. The others are items 7, 8, 12, 14 and 18.

7: Peripheral bus controller.

8: Cathode ray tube controller multiplexer.

9: 6845 CRTC. This was kept to ensure software compatibility.

10: 1770 disc controller. Allows both single and double density disc formats. Special Shift-Z-Break option emulates 8271 disc controller for compatibility.

11: Parallel modem connector. Allows third party modem to be installed. Leaves RS423 port free for other activities.

12: Keyboard controller.

13: Battery backed RAM held on chip with real time clock.

14: Chroma chip for better visual display.

15: Serial processor.

16: Co-processor sockets.

17: Video processor.

18: I/O controller.

19: Analogue to digital convertor.

20: Econet interface. Two sockets allow easy installation of Econet board.

21: Metal back panel.

Not shown: Speaker mounted on keyboard alongside lithium battery for real time clock and associated RAM.

MOS software doubles in size

The 35k Machine Operating System (MOS) spills over into the sideways ROM banks and is packed with extra features including 26 new commands. Extended graphics capabilities have been included plus 17 new OSBYTE calls, two new OSWORD calls, 12 new sideways ROM service calls and 43 base VDU functions!

The *CONFIGURE commands allow up to 22 start-up protocols to be defined in the battery backed RAM.

Space was so tight to fit all this in that the ellipse routine is stored at the top of *View*! Details on the increased graphics can be found in the *GXR* review in Dec '85 *AU*.

Filenames may now also include the filing system as part of their route.

NOTICE BOARD

ON TELEVISION

● *Ghosts in the Machine*, Channel 4, Tuesday, 11.35pm, from 7 January. Short series of the latest videos, though anyone wanting to see Duran Duran promos will be disappointed; this concentrates on videos as a 'serious' artform. It's entertaining, nevertheless, and worth catching for the computer-generated special effects.

● Also on Channel 4 in its Opinions slot, is *Technology and Liberty* (Thursday 23 January, 8pm), an investigation by Duncan Campbell into how computers are used – and abused – by the government and security services. Opinionated, but very relevant to 1986, the year the Data Protection Act comes into effect.

● *Micro Live* returns to BBC2 after the Christmas break on 17 January and the first show will carry an outside broadcast on what's new at the Which Computer? Show to be held in Birmingham that week (see On Show).

Another show in this weekly computer television series will feature the ins and outs of electronic publishing – the growth industry of the 1980s – and Leslie Judd's attempt to be an air traffic controller (see *AU* August 1985) will finally be screened this month.

ON SHOW

● 14-17 January, Which Computer? Show, National Exhibition Centre, Birmingham. Tel: 01-891 5051.

● 22-25 January, High Technology and Computers in Education, Barbican, London. Tel: 01-349 4667.

● 31 January - 1 February, Computers for General Practice, Ladbroke Mercury Hotel, Watford. Two day exhibition featuring most of the competing computer systems in the burgeoning medical market. Full details from Meditel on 021-525 8706.

● 9 July, Computers in Science, Lancaster Polytechnic, Preston. This event, which is part of a course for further education teachers, will be open to the public. Potential exhibitors contact Mrs Minall at the Polytechnic's Business and Industrial Centre.



This surreal image is one of Channel 4's 'Ghosts in the Machine'

FOR HELP

● To contact *Acorn User* authors, write c/o the editorial address given on page 2.

● Remember you have until May 11 to register with the Data Protection Registrar if you are a business micro user who processes information about individuals. It costs £22 and failure to register is a criminal offence under the Data Protection Act, 1984.

Contact the Data Protection Registrar, Springfield House, Water Lane, Wilmslow, Cheshire SK9 5AX for advice and details.

TO CONTACT

● Acorn (0223) 245200.

● Acorn's very own bulletin board service is Prestel-compatible (1200/75) and runs on (0223) 243642.

● *Acorn User's* page number on Micronet is 60043765. You can download *AU* software.

● BBC TV's *Micro Live* bulletin board is on 01-579 2288 (type INFO BBC on Telecom Gold electronic mail system).

● BBC Computer Literacy Project, Broadcasting Support Services, PO Box 7, London W3 6XJ. Please send sae.

● Bulletin Boards: A new bulletin board has started up in the Stoke area, run by the POT-BUG BBC micro user group. Apart from the usual reviews and message facilities, it contains a guide to restaurants in the area. It runs from 8pm to 11pm Mondays to Fridays, and 2pm to 11pm at weekends (as with most BBs these times can change without notice). 1200/75 or 300 baud. Board number is (0782) 503254.

Other boards: CABB 01-631 3076; CBBS London 01-399 2136; Distel 01-679 1888; Forum 80 Hull (0482) 859169; Forum 80 London 01-399 2136; Grendel (0532) 620334 (9pm to 8am); HAM-NET (0482) 497150; Liverpool Mailbox 051-428 8924; Mailbox 80 (0384) 635336; Technomatic 01-452 1500; TBBS London 01-348 9400; TBBS Nottingham (0602) 289783; TBBS Southampton (0703) 437200. *Acorn User* would like to know if these boards are still operating on these numbers and if there are any new bulletin boards.

● MEP (Microelectronics Education Programme), Cheviot House, Coach Lane Campus, Newcastle-upon-Tyne NE7 7XA. Hardware and software support for schools. Please send sae.

● MAPE (Micros and Primary Education), c/o Barry Holmes, St Helen's Primary School, Bluntisham, Cambs. User group for primary teachers. Send sae.

● MUSE (Micro Users in Schools and Education), Freepost, Bromsgrove, Worcs B62 7BR. User group for teachers and parents. Please send sae.

● National Extension College, 18 Brooklands Avenue, Cambridge CB2 2HN. Educational and training courses on the BBC micro. Please send sae.

● CET (Council for Education Technology), 3 Devonshire Street, London W1N 2BA. Government body which oversees MEP. Please send sae.

BLUNDERBOX

● The following line should be added to the First Byte listing on page 106 of the December 1985 issue:

```
461 PLA
```

Also, change line 1030 to:

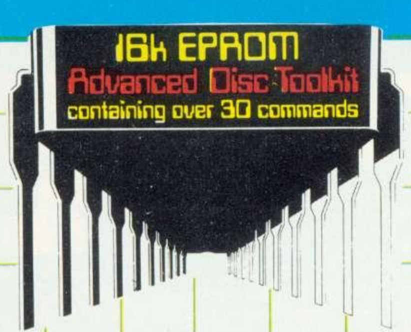
```
1030 IF C%<>12786
PRINT"Listing error":END
```

● Apologies to those readers who typed in the font generator program on page 117 of the December *AU*. Two problems have been discovered and the following lines must be added to the program in order to overcome them:

```
   94 *FX 20,0
   95 A%=&83
   96 hwm%=(USR(&FFF4) AND
 &FFFF00)/256
  100 IF PAGE<>hwm%+&600 T
HEN PRINT"Reload at &";~hw
m%+&600:END
  101 *FX 20,6
  102 FOR c%=&20 TO &E0 ST
EP &20
  103 ?oscli%=c%
  104 X%=oscli%:Y%=oscli%
DIV 256
  105 A%=&A:CALL &FFF1:VDU
 23,c%
  106 FOR b%=1 TO 8:VDU b%
?oscli%:NEXT
  107 NEXT
 1070 PROCoscli("SA. "+F$+
" "+STR$~hwm%+" +600")
```

● The number published for *Acorn User*'s Micronet page was incorrect. It is 60043765 and the suite of font programs from the December 1985 issue is currently available on Micronet.

● Apologies are also due for some mistakes in the yellow pages index in the December issue. Listings 3 and 4 from Hints & Tips will work on an Electron with Plus 1 and are also included on the monthly cassette. Also, as I'm sure you all guessed, sideways RAM is not required for listing 1 of *Shuggy's Garden!* It is however a requirement of the *BEEP listing from First Byte. Ooops!



Advanced Computer Products

Advanced Computer Products
6 Ava House, High Street,
Chobham, Surrey GU24 8LZ
(0276) 76545

Any Acorn user ...including... BBC B, B+, Electron, DFS, 1770 DFS, ADFS, 2nd. processor etc. OUR BEST SELLING Advanced Disc Toolkit. The ultimate toolkit, useful to all, invaluable to disc users, an absolute delight for ADFS users! Over 30 commands including:- file transfer (inc LOCKED cassette files to disc, DFS to ADFS), full memory & disc editor, menu, ADFS utilities, search memory/basic/disc, load & run below page, catalogue/unplug ROMS etc. etc. etc. (supplied on 16k EPROM)

"It's excellent value for money" .... (Acorn User) "Take a close look at ADT-it's suberb" .... (Database publications)

Electron & Plus 1 users - Advanced Plus 5 (A.P.5.)... coming soon the ultimate interface for your Electron! Adds:- 1) the user port 2) the 1 MHz bus 3) upgrade to the 'tube' i/face 4) 2/3 ROM/EPROM sockets. These will permit many grapic, control, and user applications to be connected. Also upgrading to the 'tube' will allow Acorn's 2nd. processors to be connected, greatly increasing BOTH the memory and the speed of your computer

BBC users ... at last you can use probably the most powerful disc filing system available! - Acorn's ADFS. BBC B+ owners can use ADFS immediately BBC B users must upgrade first to 1770 disc interface/DFS
ADFS .... £26.08 (+VAT)
1770 upgrade ..... £43.44 (+VAT)

Electron & Plus 1 users - Advanced Plus 4 (A.P.4.) coming soon A.C.P.'s disc interface. Unlike some others - fully Acorn compatible, running 1770 DFS (A.E.D) & EOO. Also includes 2 ROM/EPROM sockets

Electron & Plus 3 users .... gain BBC compatibility by adding the Advanced Electron DFS (1770 DFS) this is the same disc filing system supplied with the BBC B+. Now you can produce and access (compatible) BBC disc based softwear. A.C.P. also supplies 5 ¼" disc drives to add to your Plus 3 (inc. 2nd. drive adaptor). These enhance your system to both of Acorn's disc filing systems and both formats. (supplied on 16k EPROM)

Electron & Plus 1 users .. Advanced Rom Adaptors I & II our popular Plus 1 adaptors continue to allow compatible EPROMS to be fitted to the Electron. A.R.A. II (cont. 2 sockets) also upgradable to RAM (suitable for user's own routines)

BBC & Electron users ... NEW PRODUCT ... Advanced Disc Investigator can backup most if not ALL protected discs, copy 40 track discs onto 80 track, repair tracks, also edit, format, verify, & scan non-standard discs. 16k EPROM & comprehensive manual - only £24 (+p&p & VAT)

Order direct with complete confidence or call us for further information/friendly assistance. Also included in the list below are some of the other quality products that we can supply.

Electron & Plus 1 users ... NEW PRICE on Advanced Sideways Ram --: due to increased production and lower costs ... NOW ONLY £25 (+pp & VAT) A.S.R. is a highly versatile but simple to use S/W RAM cartridge that is automatically write protected on loading. Supplied with full software support including :- Romsave, Advanced Print Buffer & Makerom.

__ View cartridge	(e)	@ £27.95	____	__ A.D.T. (16k EPROM)	(be)	@ £34.50	____
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ORDER NOW

Electron & Tube are trade marks of Acorn Computers Ltd.

SERIOUS SOFTWARE
FOR THE BBC MICRO

TOOLKIT PLUS

Rom
£39.00



Basic programmer's aid in 16K Rom

Toolkit, chosen by thousands of BBC users, has now been re-written.

- Full screen Basic editor (Wordwise-like in use). Fully integrated and works in any mode
- Syntax checker to spot mistakes as you program.
- Host of new commands & features
- Upgrade available. Phone for details.

PROGRAM BUILDER

Disc
£21.00
Tape
£16.00



60 handy Basic routines ready to slot into your own programs

Don't bother re-writing routines that have already been professionally coded.

Fully documented routines include: input validation, data entry, circles, ellipses, graphics, passwords, string handling, date validation, sorting, screen dump etc etc

ROMIT

Rom
£34.00



RAM filing system and silicon disc facility will put your own Basic (or Wordwise) programs onto Eprom.

- Simple to use, supplied on 16K Rom
- We can even blow the Eproms for you
- Allows you to use sideways Ram as a printer buffer
- Over 20 new commands

STUDIO EIGHT

Disc
£22.00
Tape
£17.00



The sound studio. Contains over 20K of machine code which converts your BBC micro into a 4 voice synthesiser with an 8 track digital recorder with rhythm and drum machine.

A truly exciting real-time studio system.

Other Programs From



Sleuth	Murom
Masterfile	Quickcalc
Exmon II	Hershey
Help	Characters
Discmaster	Paintmaster
Dumpmaster	Teletext

WORDEASE

Disc
£21.00
Rom
£29.00



The Wordwise Plus utility disc

Adds new features such as Mail merging, Label printing, Copy (or move) seg. to seg., Auto-version no. save, Auto-printer codes, Programming Utilities, Auto-section renumber . . . and much more, to your Wordwise Plus.

- Menu driven & easy to use
- As approved by Computer Concepts

ICON MASTER

Rom
£34.00



Icon Control System

This pack automates the creation of an icon-driven user interface.

Supplied on 16K Rom it allows you to design a screen containing icons and then use it in your own programs, in place of a normal menu.

Compatible with AMX mouse & AMX icons.

ORDERING INFORMATION

All products are available from your local dealer or directly from Beebugsoft.

Prices include VAT.
Please add 50p post & packing.

Mail Order: Beebugsoft, PO Box 109, High Wycombe, Bucks, HP10 8NP

Access and Barclaycard
24 hour hotline
PENN (049481) 6666



Further Information
Telephone St. Albans (0727) 40303

SPELLCHECK III

Rom
£36.00



Rom based spelling checker for Wordwise, Wordwise Plus & View

Now in 16K with 2000 words in Rom

Even faster. On test timings . . .
Watford 1.3 DFS 1620 wpm
Acorn 1.2 DNFS & tube 2000 wpm

Comes with 6000 word dictionary disc.
Upgrades from Spellcheck.
Ask for details.

TOOLKIT PLUS



BASIC PROGRAMMING AID IN 16K ROM

A VERY SPECIAL PROGRAM

- Now in 16K
- Full screen Basic editor — Wordwise-like operation
- A host of new commands
- Unique syntax checker
- "⋆command" or menu driven
- Toolkit upgrades available

```
TOOLKIT PLUS
Diagnostic     Editing        Program
1 SEARCH       7 EDIT         D CLEAR
2 SLOMO        8 DUPLICATE    E CRUNCH
3 TRACE        9 ERASE        F RELOCATE
4 REPORT       A MOVE         G RECOVER
5 XREF         B RENUMBER     H MERGE
6 ERROR        C PSAVE        I SYNTAX
Info           Filing
J ENVELOPE     P AUTOSAVE     ESCAPE
K FREE         Q CHECK          to edit
L FUNCTION     R LOOK         CTRL-ESCAPE
M MEMORY       S SCREEN         to exit
N ROMS         T FORMAT
O TOOLS        U VERIFY       BEEBUGSOFT
Enter Option:_
```

In the two years since its launch Beebugsoft's Toolkit has been chosen by many thousands of BBC users and established a reputation second to none. The launch of our new second-generation Toolkit is therefore something rather special.

Toolkit Plus is a 16K Rom which has been written from scratch making use of the latest programming techniques. It offers over 40 commands (grouped for ease of use) and some new and very exciting features, all of which may be called directly or from a menu.

TWO SPECIAL FEATURES

1 **Syntax Checker.** The first of its kind on the BBC. As you key in your program, Toolkit will draw your attention to syntax errors that may otherwise come to light only after many program runs. You may also pass complete programs through the checker.

2 **Basic Editor.** A fully integrated full screen editor, comparable with Acorn's stand-alone Basic Editor, using 'single key' commands for Move, Delete, Search etc all from within the on-screen editor.

OTHER COMMANDS

Autosave	Save programs at the press of a key	**Check**	Compare memory with disc/tape
Psave	Partsave any program section	**Function**	Function key editor
		Envelope	Envelope display
Xref	Powerful cross referencer to display values of variables, arrays, fns, procs, etc and their line numbers	**Clear**	Clear all variables
		Free	Memory status info.
		Duplicate	Copy program lines
		Erase	Delete program lines
Format	Flexible disc formatter	**Move**	Move program lines
Slomo	Program speed controller	**Look**	List file directly from disc/tape
Roms	Display & enable/disable Roms	**Renumber**	Flexible renumber
Crunch	Amazing Basic program packer. Beats the rest. (Removed 4,500 bytes from original Masterfile II)	**Memory**	Hex and Ascii memory display
		Merge	Combine 2 programs
Search	Flexible search & replace with 4 wildcards & special options (eg ignore spaces, Rems, case etc). Integrated with editor	**Relocate**	Move program in memory
		Recover	Recover 'Bad Program'
		Report	Extended error reporting
		Screen	Screen save
		Verify	Disc verify
Trace	Output to window with single step options	**Tools**	Command summary
Error	Auto error detection	**Menu**	Toolkit menu

UPGRADE
Existing Toolkit owners may return their Rom and manual (mail order only) for a discount of **£13.50**

PRICE £39.00 inc. VAT. Available from your local dealer.
For further information: Tel St. Albans (0727) 40303
24 hour Access & Barclaycard hotline
Tel Penn (049481) 6666
Mail order to
Beebugsoft, P.O. Box 109, St. Johns Road, High Wycombe, Bucks. HP10 8NP





ROMS



DATAGEM

Long hailed as the most comprehensive and powerful database for the BBC, and now becoming a legend in its own right, DataGem has been significantly reduced in price now that development costs have been recovered by Gemini. Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE. Much has been made and exploited of DataGem's superb selective searching capability, and together with its unmatched mathematical powers, the system provides a really professional database for use in the home, office or school that will harness the full power and potential of the BBC micro.

AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 x 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

TECHNICALLY SPEAKING

The System Comprises:-

1. 2 EPROMs mounted on carrier board containing 24K of 6502 optimised machine language. Carrier board may be inserted in either of two positions under keyboard or in sideways ROM board.
2. Demonstration applications disk in both 80 and 40 track format with documented examples of DataGem files. Disk contains no DataGem program code.
3. Full colour packaging consisting of A5 ring binder with professional documentation, user registration card and quick reference card.
4. Utility program named 'Trans' also supplied to allow transference of data files from all other Gemini databases.

The System Features:-

- Permits just ONE file to exist over FOUR floppy disk drive surfaces with a maximum file size of at least 10 Megabytes.
- Allows up to 5100 User Definable Records.
- Maximum number of 62 fields per record, which may be any combination of the following types:-
  STRING – Up to 120 characters long
  DATE – Either two or four digit year dates may be selected.
  TEXT – A field with no data, allowing background text to be placed anywhere on the record. This may then be altered/moved/deleted, even after the database is in use. Up to 3000 characters of background text may be placed on the record in this way, enough for limited word processing and mail-merge.
  NUMERIC
- Allows searches on any field or COMBINATION of fields to ANY depth.
- Up to 9 subsets of data INSTANTLY available and saved to disk automatically.
- Sorts alphabetical or numeric on any field, ascending or descending with NO LIMIT on the depth of sort.
- Interfaces with 'VIEW' and 'WORDWISE'.
- Includes a free format report generator for a completely flexible printing format.
- Allows the user to extend the file or add fields after having started to enter data.
- Offers a free format painted screen which scrolls 120 x 120; and supports extensive mathematics.
- Provides User defined field relational variables and multiple and single character wildcards.
- Exists self contained on ROM, and does not require additional utilities on disk.
- Finds the occurrence of a string or partial string in ANY field in the database with just one command.
- Mathematical Operators
  +, −, ★, /, multilevel parentheses (up to 50 levels), unary negation.
- Logical Operators
  >, <, >=, <=, <>, =, ★(AND), +(OR).

WHAT OTHERS SAY

DataGem provides many of the Spreadsheet facilities of an item like Lotus 1-2-3... Combined with a Word Processor, it forms the basis of a very competent small business system.
Personal Computer News – July 1984.

DataGem stands out in terms of both price and performance. Excellent if you can afford it.
Acorn User – December 1984.

NEW DATAGEM GUIDE

Available separately to existing owners of DataGem (see below), this new and comprehensive manual has just been completely re-written by Simon Williams, a veteran press reviewer and writer. The new guide takes you step by step through all the facilities of the program with worked examples, and without any requirement for a previous knowledge of databases. It contains over 40,000 words and is fully indexed.

MONEY-BACK GUARANTEE

The power and facilities of DataGem are just too great to detail in this advertisement. As the product is protected against unauthorised copying, we are able to offer our no-quibble money-back guarantee to customers purchasing DataGem direct from Gemini. If you don't agree that it's worth the price, send it back to us undamaged within 7 days of purchase for ANY reason and we'll refund your money – immediately.



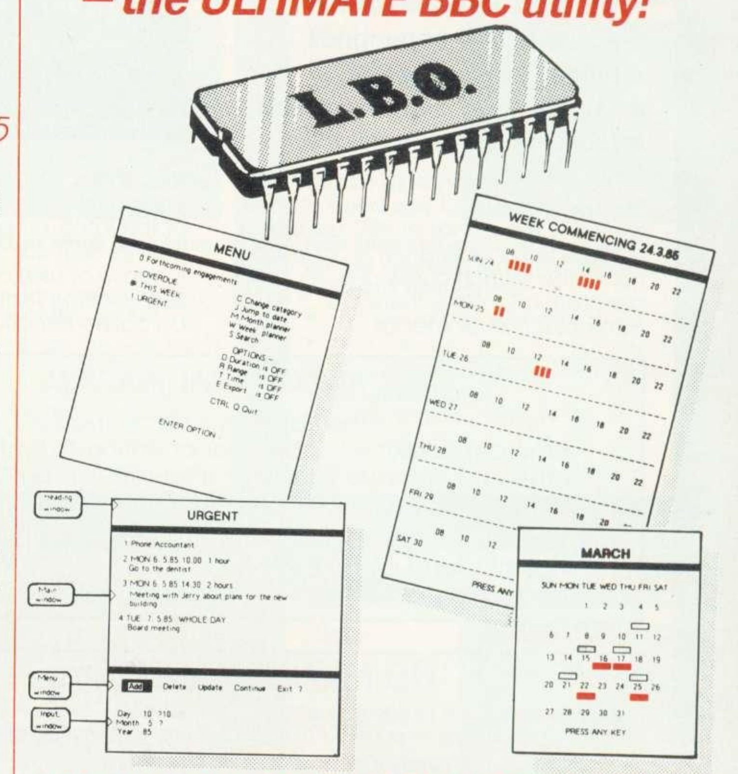
STOP PRESS!!

New DataGem owner's manual (see above) available separately at **£12.95** inclusive

Price refundable against purchase!

L.B.O. LIFE & BUSINESS ORGANISER

– the ULTIMATE BBC utility!



A NEW & EXCITING ROM RELEASE FROM GEMINI

This is a comprehensive life and business organiser package in 100% machine code which has been very carefully designed to provide a wide range of useful facilities for the busy person at home or in the office, and is simplicity itself to use. Once you start using LBO, you'll ALWAYS use it – not like one of those ROMs you only occasionally call on. LBO will put an end to forgetfulness and ensure that your time is organised, you know what you have to do and when, you don't forget bills or birthdays, and you are reminded constantly of urgent matters.

LBO was written by two graduates in Computer Science from Exeter University in consultation with a lecturer in Cognitive Psychology. It has been very cleverly researched and programmed and is confidently recommended by Gemini as a very superior program for the very superior BBC micro.

Features include:-

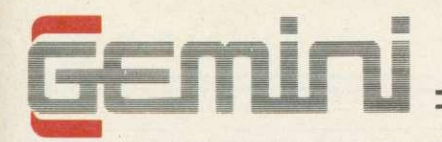
- Automatic reminder of entries overdue for attention
- One week's advance notice of forthcoming events
- Urgent notice board
- Creation of categories of entries; e.g. bills, birthdays, letters to be written, notepad etc.
- Sorting of appointments by date and time of day
- Month AND week's summary at a glance, indicating time booked and free
- Single entry of a RANGE of events and updating of regular happenings
- Super search facility to call any event by any related word or part word
- Month by month preview of all forthcoming events
- Built-in intelligent calendar
- All data saved to disk
- Full printer support
- Easy to follow documentation

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are every likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!



L.B.O. only **£19.95**

Also available on DISK for those with a cluttered ROM board – £19.95.
QL version also available now, MS-DOS version early 1986.



DISK SOFTWARE



Suite

THE REVOLUTIONARY 'TRIPLE-D' BBC DISK INTEGRATED SOFTWARE SYSTEM

Of great significance to businessmen, educationalists and hobbyists alike, these programs are certainly the most powerful and sophisticated of their breed, and may be used 'stand-alone' or together as a suite. Gemini have probably the most experience in writing serious software for the BBC micro, with classics such as BEEBCALC and BEEBPLOT achieving sales of tens of thousands of units. We have drawn on almost four years of experience and user feedback to produce what we are confident will be hailed as the ultimate in functional software for the BBC micro: the ***'TRIPLE-D'*** Integrated Suite. We've also brought it in at a price that should make it accessible to more of you, and most importantly, we're giving you REAL value for money.

The modules, which are formatted for both 40 and 80 track systems, are available separately, or as an economical combination pack. Each module is clearly documented with a comprehensive, indexed manual, with training sections that refer to demonstration applications provided with each disk. Remember, ***'TRIPLE-D'*** uses proper random-access files that will take advantage of your true disk capacity, even over TWO drive surfaces. Have you ever heard of a true disk-based spreadsheet before? Well it's here now in the form of the ***'TRIPLE-D'*** suite and can handle up to 52,000 FILLED cells! If you already have our 'DataGem' ROM database, you'll be pleased to know we've even included some special utilities for you!

I confidently recommend the ***'TRIPLE-D'*** suite to you. If you purchase the product from us and don't share my enthusiasm, return it to us in new condition within seven days of purchase and we'll refund your money – immediately and without quibble.

Dale Hubbard
Chairman & Managing Director
Gemini Marketing Limited



-BASE £29.95

- Up to 2000 records, 1 search level subset, 26 fields/record, 2 drives, 79 chars/field
- Scrolling screen, 79 x 26. Interrupt driven real-time clock
- Layout painted on-screen to your design, including background text/graphics
- Fully menu driven, with powerful line editor and access to *OS commands
- Default entry capability, no need for tedious re-typing of repetitive data
- Lightning search using advanced 'hashing' techniques
- Powerful maths, allowing all BASIC functions, on any field
- 10 user-defined variables to simplify complex calculations
- Multiple level 'intelligent' sort – program only sorts 'out-of-order' data
- Printed reports in record or summary format. Data spool option for transfer to other files
- FULL DATA COMPATIBILITY WITH 'DDD-CALC' AND 'DDD-PLOT'



-CALC £29.95

- True disk-based spreadsheet, 2000 rows, 26 columns, 52000 cells. Powerful line editor
- Fast, smooth machine code screen scroll with pop-down menu
- Individually adjustable column widths with text overflow
- Full relative and absolute replication
- Find and move to a row by name
- User defined variables, delete/insert rows, SORT rows with 'DDD-Base'
- Send data from all or part of sheet to printer, or just print cell formulae
- Data over 1 or 2 drive surfaces
- Fast recalculation, even over large files
- All BASIC functions allowed, plus 'SUM', 'MAX', and 'MIN'. *OS calls, and real time clock
- Data spool option for merging with other files
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'



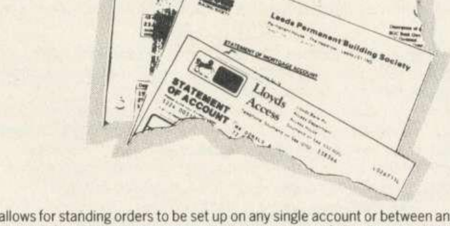
-PLOT £29.95

- Stunning menu driven colour graphics using the BBC's capability to the full
- Pie charts, histograms, scatter graphs, line graphs and function plotting
- Disk save of screen for instant recall within your own programs
- Superb data entry editor with up to 255 plottable data entries for text and x/y coordinates
- Automatic scaling with user override
- Screen customisation allowable after plotting for background text etc., with up to 64 columns in Mode 1
- Disk save of ALL data
- Statistics facilities include mean, max, min, standard deviation, line of best fit, correlation coefficient etc.
- Colours re-definable for any plot
- Epson m/c fully SHADED screen dump with interface for other dumps on request
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-CALC'

Combo Pack – All 3 modules £69.95



MONEY MANAGEMENT



This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate Bank/Building Society/Investment accounts AND up to 5 Credit card/loan/Mortage accounts.

The transactions are also analysed – and may be (screen) listed – under 3 separate Income and 15 separate Expenditure headings.

Each transaction consists of:
(1) Date
(2) Description – up to 16 characters
(3) Amount
(4) Last 4 digits of cheque no. or a credit card transaction reference. (Payments only)

Account and income/expenditure headings may be personalised.

Budget amounts can be stored for each of the 15 expenditure heads and a report shows how expenditure to date compares with the budget. It also shows the balance remaining. This report is also produced in percentage terms and a third report forecasts annual expenditure based on expenditure to date at any particular time.

A further report gives balances for each Bank/Loan account at the beginning of the year, balances for each income/expenditure account to date and the resultant Bank/loan account balances. This report represents, therefore, the changes in liquid assets and liabilities over the period, both in terms of totals and of distribution between accounts.

The main menu contains a print option for this report.

Lists of outstanding cheques or credit transactions may be produced for each account and when statements are received, input of the cheque reference no. (last 4 digits) and the amount causes verification to occur (on screen), whereafter these cheques are removed from the cheque no. file, the remaining list of unpresented cheques allowing simple reconciliation of each Bank a/c. Similar reconciliation of credit card a/cs can be achieved.

The program caters for transfers between accounts (e.g. from Bank to Building Society a/c or from Bank to Credit card a/c etc) the relevant details being input only once.

The program also allows for standing orders to be set up on any single account or between any two accounts. These are paid simply by inputting a date up to which the payment of all orders should be recorded. The necessary debits and credits are then created and the date of each order is reset. Orders can be for any multiple of calendar months.

The program is fully menu driven and all areas of input are 'range protected'. As much guidance as possible is included in all screen displays and the user is always given the opportunity to abort a transaction.

Full amendment and deletion routines are provided; for individual transactions, for Standing orders and for budgets.

The main file can hold between 800 (all full length descriptions) and 1800 (no descriptions) transactions. The former should be sufficient for most people for at least one year and the index file size is set on this basis. A warning is flashed on the main menu when the main file reaches 750 transactions. Account balances may be carried forward to a new set of accounts.

All you will ever need in a home finance package and beautifully presented.







With over four years experience of providing practical software solutions for business and home applications, Gemini have put together a selected range of famous titles for the BBC and BBC Plus in TWO special packs, at VERY SPECIAL prices. These super value packs contain all the serious application software you're ever likely to need for your BBC, from spreadsheet and database management to a complete professional business accounting system. Gemini's 'OFFICE MATE' and 'OFFICE MASTER' packs are here – put that computer to WORK!



• DATABASE • BEEBCALC SPREADSHEET • BEEBPLOT GRAPHICS • WORD PROCESSOR • FULL DOCUMENTATION

DATABASE

Use this program for storing all types of information just the way YOU want to store it. You set up a computerised 'card index' system and add records and data to the file in the format that you choose.

Advanced features include sorting and searching for specific records, mathematical calculations, printer routines, data summaries etc. If you don't have a database, you certainly should!

BEEBCALC SPREADSHEET

Perhaps the most commercially successful item of business software yet written, the Gemini Spread Sheet processor offers a very wide range of invaluable calculation and editing features.

Consider, for example, a Cash Flow forecast containing rows and columns of figures, combined with text and numbers. If say, the cash receipts for January need to be changed, it would normally be necessary to delete and recalculate several figures for each successive month.

With BEEBCALC, however, an 'on screen' amendment to the January figure is made, and the corrected figures for each successive month automatically appear upon touching the 're-calculate' key.

Formulae cells in the table may be specified which relate to each other and then copied RELATIVELY or ABSOLUTELY to other parts of the program, which in itself is modular, and directly linkable to other Gemini programs. BEEBCALC has a complete range of inbuilt data entry and formatting techniques, and the structure of the table may be amended at any stage. Of course, full printer facilities are included which allow for either the table to be printed or just the data and formulae relating to the table. Another important feature, any valid BBC BASIC formula is acceptable as data entry making the system immensely powerful and versatile. BEEBCALC's sister program, BEEBPLOT will take data from disk or tape files created by BEEBCALC to provide data portrayal in graph, histogram or pie chart format.

BEEBPLOT Graphics

Written specially for use with the BBC micro, this program makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

For example monthly sales statistics comparing two year's results may be instantly converted into two side by side pie charts, histograms or graphs ... for easier visual comparison and assimilation.

BEEBPLOT also incorporates a built-in machine code screen dump, enabling a high resolution printed image to be produced using an Epson or similar bit image compatible printer. It also interfaces with other Gemini programs such as Beebcalc and Cash Book and is particularly recommended where any kind of mathematical plotting facility is required.

WORD PROCESSOR

This program provides many routines found in large and more expensive packages. With a typical word length of 5-6 letters it allows for up to 1000 words in memory at one time and is ideal for the user who wishes to write any kind of business letter on a home computer.

Features include: block delete, block insert, search and replace, edit text, display text, and many more.

Step up to Office Mate and save money! (Price if purchased individually - £79.80 – save £67.80 with this pack) Electron version available, pack contains Database, Beebplot, Beebcalc, Home Accounts, Cassette only.

OFFICE MATE £12 Cassette or Disk



• CASH BOOK • FINAL ACCOUNTS • MAILIST • EASILEDGER • INVOICES & STATEMENTS • STOCK CONTROL • FULL DOCUMENTATION

CASH BOOK

Gemini's CASHBOOK is a complete 'stand-alone' accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cash book system and will provide you with a computerised system complete to trial balance.

Simple to use, this program will replace your manual cash and bank records and provide vital management information at any time. It will take you from sheaves of invoices and cheque book stubs to trial balance, and may, if desired, be used in conjunction with the Final Account program.

Typical information from CASHBOOK is as follows: **1.** Summary of VAT information to enable completion of VAT returns. **2.** Cumulative receipts and payments report analysed over the standard profit and loss and balance sheet headings. **3.** Option for departmental analysis of sales and purchases. **4.** Printout of all transactions, nominal account balances etc. **5.** Journal routine for entering transfers between accounts and year end adjustment for debtors, creditors, etc. **6.** Trial balance. **7.** Full audit trail facility.

This program is recommended not only for businessmen, but also for practising Accountants for use in the preparation of Accounts from incomplete records; a printer is essential.

FINAL ACCOUNTS

Requires Gemini 'CASHBOOK' module (except Commodore 64 version)

This program will take data prepared by your Gemini Cashbook module and produce a complete set of accounts for you in the following format: **1.** Trial Balance with inbuilt rounding routine. **2.** Notes to the Accounts. **3.** VAT summary. **4.** Profit and Loss Account with comparatives facility. **5.** Balance Sheet with comparatives.

All reports may be produced at any time interval comparing actual to budget if required.

MAIL LIST

Gemini's Mailist program will enable you to keep a record of names and addresses and then print, examine, sort and find themn, all with special selection techniques. All our mailists contain our exclusive 'SEARCHKEY' system, giving you the option of creating your own dedicated coding system for each name on file. For example, on most mailing list systems, you are only given the standard heading such as name, street, town, country, postcode etc. With the Gemini searchkey system, you could find, say, all names on the file that are companies having a turnover in excess of '50,000' or all names that are subscribers who are behind in their subscriptions or all names that are eligible for a Christmas card this year!

A full and useful range of routines is included in the menu, and the program allows you to set up your own format for printing labels, i.e. the tab settings you require and spaces between labels, etc. Multiple copies can also be printed.

EASILEDGER

Contains routines to enable the small business man to keep a record of one of the most important aspects of his business – cash flow.

EASILEDGER is essentially a debit/credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information. Its flexibility lies in its ability to produce account balances instantly for debtors and creditors, together with a record of all transactions, dates and references. A year-to-date summary of sales, purchases, receipts and payments over the twelve month period is also provided, as is a complete INTERACTIVE bank account database.

EASILEDGER is a management aid software tool and is designed to run alongside an existing accounting system. If you operate a cash based business and require a complete accounting package to produce the accounts to trial balance and beyond then we recommend you consider using both Easiledger and Cashbook programs together.

INVOICES & STATEMENTS

The Gemini INVSTAT program greatly reduces the time and cost of preparing Invoices and Statements by storing essential information such as customer names, addresses and account numbers, VAT routines and footer messages such as 'Please remit by return', 'Overdue and outstanding', etc.

Not only are Invoices and Statements produced more quickly and accurately, but pre-printed forms for them are eliminated since the INVSTAT program produces professionally formatted documents using your own printer.

STOCK CONTROL

You have a stock of products. With the Gemini program you may enter details of each product on to a record card on the computer with details of your own existing part number (if any), a description of the product, the unit quantity (i.e. one, a gross, a pair, etc.), the cost price per unit, the selling price per unit, a specified minimum satisfactory stock level, units in stock ordering quantity and supplier details.

The program will allow you to enter stock received, stock out, and will also give you a summary of stock items and current holding, together with details of total cost of stock, total sales value of stock, current gross margin on stock, cost of bringing stock up to minimum level, understocked items, etc.

Each stock item has its own computerised record and you may browse through the file as a whole, or just a specified number of records. An extremely powerful program, highly recommended for inventory control in small and medium sized businesses.





INTEGRATED ACCOUNTS & HARDWARE

WHY INTEGRATED ACCOUNTING?

Because it will retrieve information stored in one program for use by another, and store data in one program which has been generated by another.

This means that the scope for human transposition error is virtually eliminated ... for example, when typing an invoice manually, the typist could type £14.25 instead of £41.25, and undercharge the customer. Such an error cannot occur with integrated, computerised invoice generation, since only the part number needs to be entered and the price (and product description), are taken AUTOMATICALLY from the Stock Control program, and printed AUTOMATICALLY onto the Invoice.

Likewise a Stock Controller, operating a manual system, could transpose the quantity sold, when posting from a copy invoice, and deduct 93 pcs from the Stock card, instead of 39. This would understate the book stock by 54 pcs, and possibly cause the product to be re-ordered, and consequently overstocked. Again, this could not happen with an integrated system, since the quantity invoiced is AUTOMATICALLY deducted from stock, due to integration of the Invoicing and Stock Control programs.

WHY THE BBC MICRO?

Because, although originally designed as an educational computer, it has the facilities needed for serious business use. In particular, speed of operation ... although only an 8 bit machine, it has a faster operating speed than many 16 bit micros. By gearing a suite of Integrated Accounting programs to the BBC Micro, Gemini have produced a combination of excellence which will eclipse any other computerised business system in its price bracket ... and many other systems in much higher price ranges.

WHY GEMINI?

Because our business software for the BBC Micro is based upon the solid foundation of experience.

We have successfully written business software for the BBC Micro since it was first launched.

Your choice of software for a computerised business system is critical ... badly written programs could bring your business nearer to ruin, more quickly than almost any other investment. The fine reputation of Gemini, evidenced by the Independent press comments listed below, are your guarantee of confidence in the professional experience which back this major investment in the efficiency of your business.

INTRODUCTION

Designed for the small to medium sized business user, where speed and efficiency are vital, Gemini Integrated programs are suitable for sole traders, partnerships, or limited companies. All require a BBC B 32K microcomputer, and an 80 column printer. A double disk drive with an Acorn compatible DFS is required for integrated accounting purposes. A single disk drive may be sufficient where modules are used independently, although this is not recommended for the Sales Ledger and Invoicing module. The manuals indicate the system capacities for various disk drive combinations.

The programs have been devised by H.C.C.S Ltd in the light of substantial mainframe computing experience, and share many of the features normally found only in very large installations. Used in a typical business environment where invoicing, sales ledger posting, stock control adjustment and nominal ledger posting is simultaneously made, the software will convert the BBC micro into a business computer of enormous power, directly comparable with hardware/software combinations costing many times its price.

Each program is supported by a comprehensive, easily followed manual, and 'user friendly' screen prompts with error trapping routines, which make a specialised knowledge of accountancy unnecessary for the average user. All the programs, however, have many sophisticated features which make the programs revolutionary for the home micro market.

Gemini Marketing Limited confidently recommend the programs to serious commercial owners of the BBC B micro as software capable of making an enormous contribution to business efficiency and profitability at minimal cost, since it requires no expensive second processor in order to achieve the advantages of integrated accounting.



Price **£69.95** per Module

Includes 1 year software support

INDEPENDENT PRESS COMMENTS

John Vogler reporting in December 1984 edition of 'A & B Computing' said of Gemini Integrated Accounting when comparing to Peartree, Micro Aid, Software for All, Acornsoft Mirle and Sage:–

"This is the newest and most exciting. To have achieved a substantial degree of integration, very rapid file access and respectably large file sizes, without the use of a second processor, is a fine achievement. As one would expect from GEMINI, the individual modules are eminently professional and for the first time present the single processor BBC as a viable small business computer ... GEMINI have produced a superb product ... superb examples of the programmer's art."

INVOICING & SALES LEDGER

The Gemini Sales Ledger and Invoicing program will produce invoices and statements for customers and enable a tight control over credit procedures to be maintained by producing aged debtors reports, and by keeping current information concerning customer accounts.

The module can be used independently or interfaced with the Gemini Nominal Ledger and Stock Control modules, and offers the following advantages: • Maintains open-item sales ledger. • Comprehensive customer Master File maintained in memory. • Choice of fixed and free format invoices. • Integrates with Gemini Nominal Ledger and Stock Control modules. • Prints invoices, invoice copies, statements and credit notes. • Reports include: Aged Debtors, Sales Daybook Sales analysis by user defined code, VAT analysis, Audit trail giving copy details of all transactions. • Automatic updating of sales ledger. • Comprehensive accounting controls including period end close down routines and full audit trail for all transactions. • Examine customer status by file enquiry to screen or printer showing year to date activity. • Trade and settlement discount terms definable for each customer. • Caters for up to 5 rates of VAT. • Can hold up to 135 customers on 40 track disk system and up to 610 customers on a 80 track disc per Sales Ledger file. • Comprehensive analysis of invoices over unlimited, user definable sales codes. **Price £69.95.**

PURCHASE LEDGER

Used independently or interfaced with the Gemini Nominal Ledger, the program maintains a complete file for each supplier, records amounts outstanding at any time, helps to determine which invoices are payable, and payment dates for the claiming of discounts. Among this module's many features are the following: • Automatic posting of suppliers' invoices to Purchase Ledger. • Comprehensive analysis of invoices over unlimited, user definable expense headings. • Comprehensive accounting controls including period end close down routines with posting reports, and full audit trail facilities at appropriate stages of processing. • Full integration with Gemini Nominal Ledger module. • Purchase invoices and credit notes easily processed. • Supplier file held in memory, with full details of each supplier. • Maintains open item purchase Ledger. • Management of invoices due for payment within cash restraints. • Maximum number of suppliers on 40 track disk system of 135 and maximum of 610 suppliers on 80 track disk system per Purchase Ledger file. **Price £69.96**

NOMINAL LEDGER

This is the central module of the Integrated Accounting system and may also be used independently as a Cash Book or interfaced with the Sales and Purchase Ledgers and payroll programs. It includes the following main features: • 143 Nominal accounts all of which are user-definable. • Posting of transactions from Sales and Purchase Ledgers and Payroll modules. • Full Cash Book facilities. • Print out of full Trading and Profit and Loss Account and Balance Sheet together with notes to the accounts. • Full accounts may be produced for whatever period chosen by the user. • Comprehensive accounting controls including period end close down routines and complete audit trail for all transactions. • Journal feature for adjustments between accounts and correction of book-keeping errors. • Reports include: Account Master File showing complete code listing. Cash Book entry details. Journal printouts. Trial Balance. Trading and Profit and Loss Account with notes. Balance Sheet with notes. Audit Trail Enquiry for all accounts. • Account enquiry showing movements over the period under review including opening balance, period end adjustments and closing balance. • Account posting masks allow conversion of analysis codes set up in other modules into selected user-defined Nominal Ledger codes. **Price £69.95**

PAYROLL

This program provides a full range of controls over the different aspects of Payroll Accounting icluding tax and other deductions. It can be used independently, or interfaced with the Gemini Nominal Ledger, and offers the following facilities: • Employee file maintained in memory, containig: Name, address, sex, marital status, National Insurance Number and contribution type, date of birth, personnel number, department, date employment commenced, all applicable tax codes, whether week 1 or month 1 applicable, hourly or salaried, pay cycle, payment type (cash, cheque or direct transfer), PAYE reference number, previous name, bank details. • Supports weekly, fortnightly, four weekly or monthly employees. • Company master file containing: Name, address, bank account number and name, bank name and branch, PAYE reference. • Produces cash analysis of note and coinage to suit requirements. • Employee pay details include: Gross pay and tax paid to date both current and previous employer. National Insurance contribution for employer and employee. Five rates of overtime per employee. Up to 12 standard and 5 non-standard pay elements per employee. Basic pay. Hourly rate. • Reports include: Payroll reconciliation, Payslips, Coinage analysis, Cheque and bank giro list, Payroll masterfile, Departmental analysis. • Relevant data to complete Inland Revenue forms including: P11, P35, P45, P14/P60. • Maximum 98 employees on 40 track disk system and 198 employees on 80 track system per Payroll file. **Price £69.95**

STOCK CONTROL

A program providing full control over every aspect of stockholding operations which can be interfaced with the Gemini Sales Ledger and Invoicing program, this module includes the following features and routines: • Inventory Master File holding details of part number, selling and cost price, sales and product code, current stock, location of stock, allocated items, re-order level, quantity on order, current period activity and supplier code. • Permits four types of transactions – sales, returns, receipts and adjustments. • Part enquiry routines for any stock item. • Reports include: Part catalogue, giving stock sales and cost values. Re-order report. Evaluation stocks list, giving stock sales and cost values. Dormant parts report. Delete parts report. Stock usage report. Stocktaking sheet. Stock audit report sorted into part sequence and transaction type and date. • Screen prompt when item falls below the minimum re-order level. • Directly interfaces with Sales Ledger to enable automatic generation of product details for invoice production and adjustment of stock records. • Maximum 980 part numbers on 40 track disk and 1980 on 80 track disk per stock file. **Price £69.96**

Gemini Midi Maxi Offices, sole distributors to the trade –

CentreSoft Ltd

Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham, B7 4LY. Tel: 021 359 3020. (Mail order to Gemini).

Special Hardware/Software OFFERS

Having arranged bulk hardware purchasing discounts, Gemini is now able to offer complete systems of hardware and software offering unequalled value for money. We offer a choice of hardware only or hardware with software as follows:–

DEAL 1

BBC SYSTEM comprising:–
- BBC 32K with DFS
- 40/80 switchable 800K double disk drive
- 80 column printer
- 12" screen monitor (for colour add £150 to system price)
- All connecting cables

OUR PRICE INC. VAT £999.95

MS-DOS version soon.

✣ Please enquire by telephone for prices of individual hardware items.

DEAL 2

DEAL 1 with the addition of the following:–
- 'DDD' Integrated database, spreadsheet and graphics
- DataGem database ROM
- Integrated Accounts – ALL 5 MODULES
- Mail Merge utility for Integrated Accounts
- 'Video Classroom' programming educational video (VHS only)
- 'Life & Business Organiser' ROM
- 'Maxi Office' software pack
- 1 pack each pre-printed stationery; payslips, statements, remittance advice, invoices for use with integrated suite, plus one box 2000 sheets listing paper.

USUAL PRICE £1650 – OUR PRICE INC. VAT £1395

If not ordering by telephone, please use this order form to order any item on this page, or three preceeding pages. Please state your requirements clearly, and whether you require 40 or 80 track format when ordering disks.

Please allow 7 days for delivery.

24 hour CREDIT CARD HOTLINE – AMEX/ACCESS only – 0395-265165

All stated prices include VAT and post/packing.




To: Gemini Marketing Ltd., Gemini House, EXMOUTH EX8 4RS

Please supply ____________________

Name ____________________

Address ____________________

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Cheque/POs value £________ enclosed, or please debit my Access/Amex no.____________

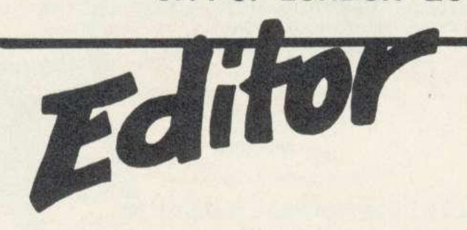
Signature ____________________

Export/Trade enquiries and Local Authority POs welcome.

AU

MIRRORSOFT

FLEET STREET



Welcome to the world of personal publishing on your BBC Micro!

FLEET STREET EDITOR gives you everything you need to produce professional-looking printed materials – in one package!

The different stages in newspaper and other types of print production processes are represented by the six different 'departments' in the program. By following these stages through the program and comprehensive manual, you can blend text and graphics to produce printed materials for a wide range of applications.

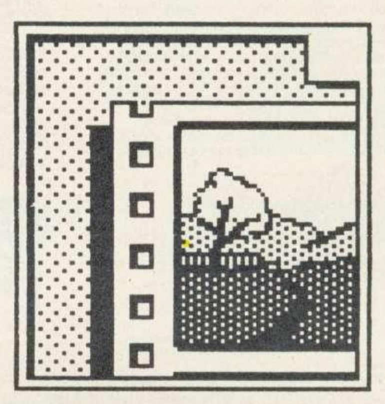
Whatever information you want to communicate, FLEET STREET EDITOR will make your task easier and more enjoyable... and save you money!

That's right – FLEET STREET EDITOR not only provides you with a complete publishing package. As part of the package, you also receive valuable money-off coupons for Cumana disk drives and Touch-Pads and for Mannesmann-Tally dot-matrix printers.

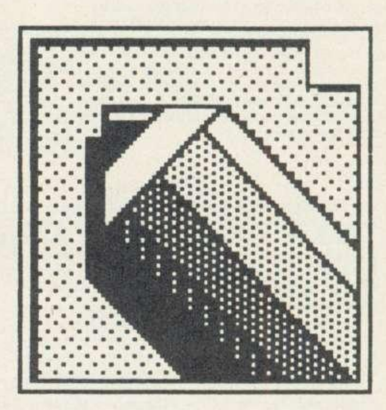
All this for just £39.95 including VAT!

A QUICK TOUR ROUND THE DEPARTMENTS

Each Fleet Street Editor page is constructed as a series of panels, with up to 8 panels per A4 page. Here's where you construct those panels:



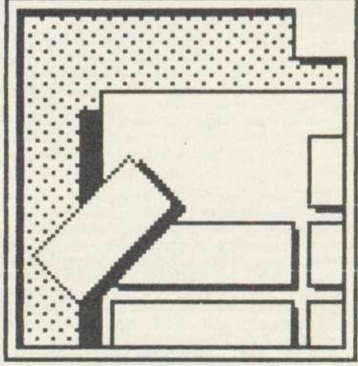
GRAPHICS LIBRARY
200K (about 600 pieces) of ready-to-use art – illustrations, symbols, and display typefaces which can be incorporated into your own work.



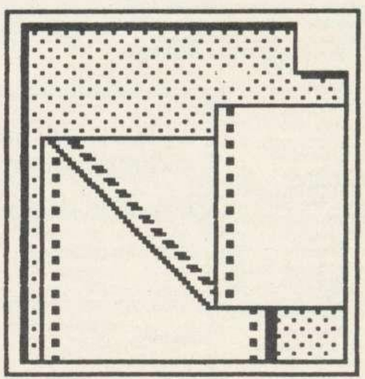
STUDIO
Where you modify existing art from the Library or your own collection, or create your own. All the graphics in the Library were created here.



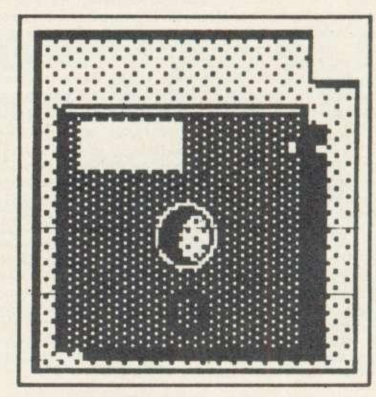
COPYDESK
Input your text here, using either the program's word processor or existing View or Wordwise files, and watch it wrap automatically round your graphics. Use different fonts, too.



PAGE MAKE-UP
Define the format for your page and construct it from the catalogue of panels you've built up. Some panels are provided ready-made for you to experiment with.



PREVIEW AND PRINT
Preview a reduced representation of your completed page on screen, approve it, and send it to your printer using one of the built-in printer-drivers – you can write your own, too.



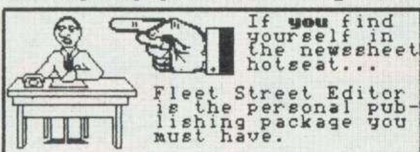
ADMINISTRATION
Set up the program to suit your system configuration, format disks, integrate graphics from any Mode 4 program, and further manipulate Fleet Street Editor files.

FLEET STREET EDITOR

Issue No.1 January 1986

GIVES YOU WORDS ... AND PICTURES

In any way you wish – **together**





or separately ...







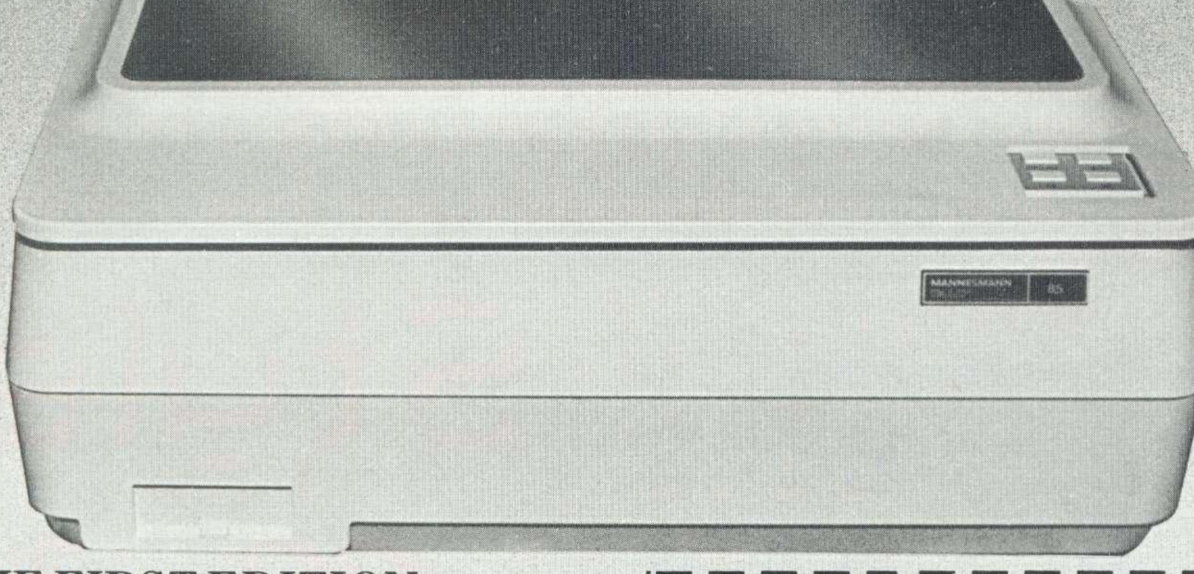
You can use text in many ways: regular, **bold**, inverse and, of course, with fancy

Headlines & Titles in your text.

All this, and more, can be done in this one package – with nothing extra to buy!



Mirrorsoft



THE FIRST EDITION

Publication: January 23rd 1986

The minimum equipment you need to become a FLEET STREET EDITOR is:

- BBC Model B with disk interface
- 40 track single-sided disk drive
- Dot matrix printer capable of 640 dot bit image mode and true descenders
- Monochrome monitor or TV

You can configure the program to any type of drive combination via the Administration department.

FLEET STREET EDITOR is supplied on two disks – one containing the program and one containing the graphics library. These are formulated in different ways for different drive configurations, so take care when ordering or buying FLEET STREET EDITOR that it matches your current system. Upgrades are available.

The registration card supplied in the back of the manual, when completed and returned to us, will ensure you receive details of new software designed to enhance your FLEET STREET EDITOR.

Complete the coupon and return it to us for a detailed brochure or to place a firm order. FLEET STREET EDITOR should also be available from good software stockists everywhere.

ORDERS Please tick

I would like to order FLEET STREET EDITOR. ☐

My disk system is as follows:

____

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I enclose my cheque No.__________ for £39.95 OR

Please debit my Access/Visa account no.

Signature ____________________

Please allow 21 days for delivery

INFORMATION Please tick

Please send your detailed brochure on FLEET STREET EDITOR ☐

Name ____________________

Address ____________________

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__________ Post code __________

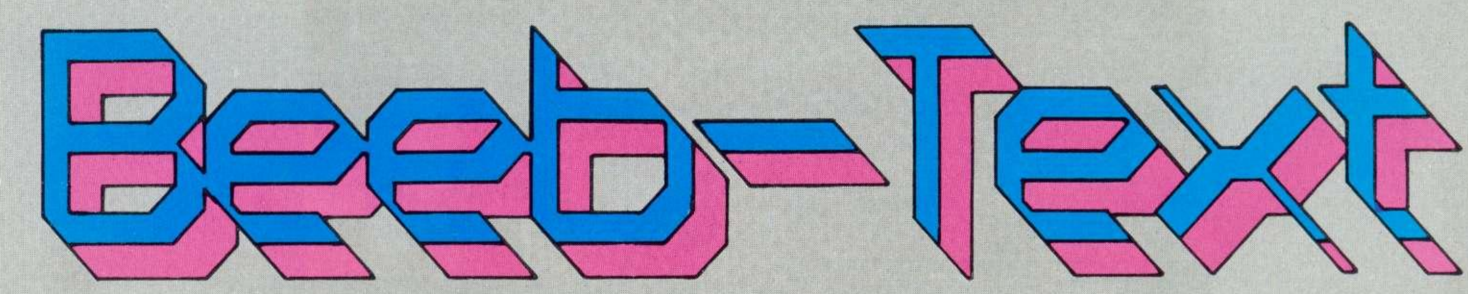
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MIRRORSOFT LTD **FREEPOST BS4382, Paulton, Bristol BS18 5BR** (no stamp needed)

BEEB-TEXT • LETTERING • OUTLINED • SHADOWED • SLANTED • BLOCK EFFECT

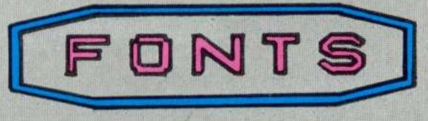
Proxima Software

PROUDLY PRESENTS



A unique BBC micro text-display enhancer

Beeb-Text Plus has arrived. More features, easier to use (picture data can now be saved and recalled & there's a revised editor menu), THE text display tool for the BBC Micro.
Ideal for eye-catching carousel message displays, poster design, video titling, use in the classroom.



1NE 5IVE
2WO 6IX
3HREE 7EVEN
4OUR 8IGHT

Style! on a slant?

SPACING

"GREAT POTENTIAL"
(Educational Computing)

FEATURES INCLUDE:-

- Any size text from eight default styles
- Slanted italicised text
- Outlined, shadowed and block-effect styles
- Default character shapes can be user defined
- Proportional spacing
- Styles may be freely inter-mixed
- Screen data-compressor and display re-expander (for max. disc usage)
- Comprehensive carousel display programme
- Page parameter data can now be saved for re-use later
- Integral screen dump
- Works with most single or double density disc systems
- BBC Plus compatible

Existing PROXIMA Beeb-Text users can upgrade to Beeb-Text Plus by returning their original disc and instructions plus £5.00 to Griffen Computers.

AVAILABLE FROM:- GRIFFEN COMPUTERS, CASTLE WALK,
LOWER STREET, STANSTED, ESSEX CM24 8LP
TELEPHONE: 0279 812295



Access

GC Proxima

Does your micro answer back?

- Does your micro chat to 70,000 people across the UK?
- Can your micro interview pop stars, hackers and doyennes of the computer industry?
- Can your micro provide the answer to your technical and software problems?
- Could your micro send and receive telex's worldwide?
- Does your micro do your shopping for you–and have it delivered to your door?
- Is your micro an answering machine, delivering your private mail whenever you log-on?

NO?………………….Shame!

Bring your micro to life!

Micronet 800–

Micronet 800
8 Herbal Hill, London EC1R 5EJ
Telephone: 01-278 3143

To: Micronet 800, 8 Herbal Hill, London EC1
Please send me a brochure on Micronet 800

Name____________________

Address____________________

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__________Telephone No__________

Age__________ Micro__________

AC JAN '86

BRING Twillstar

COMPUTERS

BBC Mod B Plus - 64K	£399.00
BBC Mod Plus with Econet	£410.00
BBC Mod B Plus with DFS and Econet	£465.00
BBC Mod B Plus - 64K with 64K Upgrade Kit	£449.00
BBC Mod B Plus - 128K	£449.00

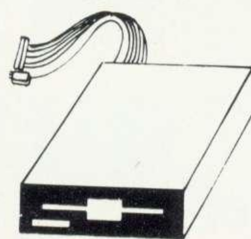
DISC DRIVES

CSX 100 (100K) 1 x 40 Track Single Sided Drive Excluding PSU	£95.00
CSX 400 (400K) 1 x 80 Track Double Sided Drive Excl. PSU	£110.00
CDX 800S (800K) 2 x 80 Track Double Sided Drive Excl. PSU	£185.00
CS 400 (400K) 1 x 80 Track Double Sided Drive Incl. PSU	£130.00
CD 800S (800K) 2 x 80 Track Double Sided Drive Incl. PSU	£229.00

MITSUBISHI 400K Single Drives Cased 40/80 Track Switchable £99.00

THE BEST NAME IN MEMORY - SPECIAL PRICES

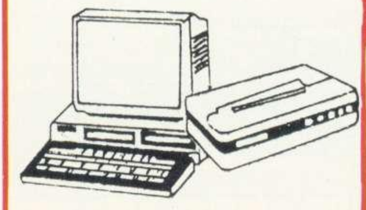
"CUMANA"



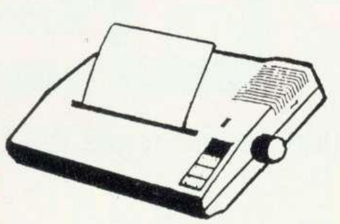
TCL SPECIAL PACKAGE

The BBC Plus all in one Word Processing Package contains a 64K BBC Plus, View 3.0 WP, Hi-Res Green Screen Monitor, 800K Dual Drives, Quendata Printer, Box of Discs, and all the necessary leads and cables housed in a strongly constructed, high impact ABS unit colour matched to the BBC micro giving your BBC Micro System the professional PC look.

Special Offer £999.00



EPSON LX80 + NLQ for WORD PROCESSING



SPECIAL OFFER of the month £229.00

PRINTERS

DOT MATRIX PRINTERS

The new Centronics GLP Printer with 50 CPS and NLQ **£113.00**

The new Seikosha Printer with 100 CPS and NLQ 1000A **£199.00**

Just arrived Seikosha GP50 Graphics Printer.

Seikosha GP50A (Parallel)	£69.00
Seikosha GP50S (Inc. Spectrum Printer Interface & Cables	£69.00
Kaga KP810 (NLQ)	£269.00
Kaga KP 910 (NLQ)	£379.00
Canon PW 1080A (NLQ)	£269.00
Canon PW 1156A	£379.00
Star SG 10	£249.00
Star SG 15	£389.00
Epson LX 80	£229.00
Epson FX 80	£365.00
Epson FX 100 F/T	£495.00
Brother EP 44	£228.00
Shinwa CP 80A	£189.00
MP 165	£240.00
Juki 5100	£269.00

BARGAIN BUY

The new Citizen 120D with 120 CPS and 25 CPS NLQ. Tractor and friction feed standard. IBM and Epson compatible with full Two Year Warranty.

Citizen 120D ~~£189.00~~ £175.00

DAISY WHEEL PRINTERS

Brother HR15	£349.00
Quendata DWP 1120	£199.00
Juki 6100	£319.00
Juki 2200	£275.00
Juki 6300	£799.00

COLOUR PRINTERS

Canon PJ1080A	£440.00

PLOTTERS

Penman Plotter (complete with utilities and cables)	£235.00

BBC UPGRADES

A-B Upgrade	£110.00
Acorn DFS Interface	£89.00
Econet Interface	£49.00
Speech Interface (Special Offer)	£25.00
64K Upgrade Kit	£39.95
17/70 Upgrade Kit	£49.95
ADFS ROM	£29.95

MONITORS

MONOCHROME MONITORS

Phillips BM7502 Green Screen	£79.00
Phillips BM7522 Amber Screen	£95.00
Kaga KX1201G Hi-Res Green	£103.00
Kaga KX1203A Ultra Hi-Res Amber	£120.00

COLOUR MONITORS

Microvitec 1431 Std Res	£212.00
Microvitec 1451 Med Res	£275.00
Microvitec 1441 High Res	£420.00
Microvitec 2030 CS20 Std Res	£435.00
Microvitec 1431AP Std Res	£228.75
Microvitec 1451 AP Med Res	£320.00
Kaga RGB Vision II 12" High Res	£258.00
Kaga RGB Vision III 12" Ultra High Res	£365.00

NEW Phillips CM 8501 Std Res Monitor with grey glass screen RGB and audio input. Only **£199.00**

NEW Phillips CM 8533 Medium Res monitor with dark glass etched screen composite video input RGB and audio input **£259.00**

TV MONITORS

NEW Phillips 1114 Colour TV/Monitor with 14" tube offering 10 preselect channels. RF CVBS and RGB inputs. **£209.00**

No more Messy Wires



Mushroom Console

TCL SPECIAL WORKSTATIONS

Once again TCL has answered a special need of all BBC Computer users with the new mushroom workstation - no more untidy wiring or pulled plugs. Transforms your system into a handsome console unit.

Features include:

- ★ **Advanced Cable Management Twin 400K Mitsubishi Slimline Drives switchable from 40 to 80 Track with Status Indicator LED's**
- ★ **On board regulated 4 Amp power supply with overload protection**
- ★ **Mains Input Filter for clean power supply.**
- ★ **Filtered power to the 3 Take-off sockets at rear for Micro, Monitor and Printer.**

MUSHROOM WORKSTATION

At a Special Price of **£349.00** inc. VAT

Those people already owning disc drives can have them fitted into the Workstation. Prices on request.

EXPANSION BOARDS

RAMAMP RA20+44

The RA20+44 board has 20K of RAM addressed from &3000 to &7FFF when switched on with *VIDEO. This will in effect give you back 20K of RAM if you are using say MODE 0. There is also 2 slots of sideways RAM from &8000 to &BFFF which can be used for ROM based software. There is a further 12K of RAM from &8000 to &AFFF which can not be used as sideways RAM. This is the situation in the BBC+ and it means in effect that this board will turn your BBC into a BBC+ as far as the VIDEO and the extra 12K RAM is concerned. One can read and write to this 12K RAM in the same way as the BBC+ does. We offer this RAM as a printer buffer.

RA20+44	£79.00
Write protect kit	£5.00

RAMAMP RA32N

The RAM/ROM board has 6 slots of ROM and 2*16K of sideways RAM that is addressed from &8000 to &BFFF. THIS EXTRA RAM IS NOT AN EXTENSION OF MEMORY FOR BASIC.

RA32N	£59.00
WPK/N	£5.00

RAMAMP RAM16

The 16K RAM BOARD (RAM16) is a sideways RAM board which plugs into any spare ROM slot. It is addressed from &8000 to &BFFF. THIS EXTRA RAM IS NOT AN EXTENSION OF MEMORY FOR BASIC. A write protect switch can be fitted. Any utility can be *LOADed into the RAM directly from Disc with the command *LOAD "FILENAM" 8000 RETURN. This can be done wherever the board is fitted, the slot need not be specified.

RAM16	£32.00
WPK/RAM16	£2.50

RAMAMP ROM6S

The ROM board has 6 slots of ROM (ROM6). Each slot can accommodate any 8K or 16K ROM. One can NOT fit RAM at a later date.

The board is fully buffered.

The board is compatible with all D.D.D. Controllers, RAVEN 20 and indeed our own RA20+44. It is compatible with the SOLIDISC 16/32K or 64K sideways ram board.

ROM6S	£32.00

RAMAMP RA32+

The RAM/ROM board has 4 slots of ROM and 2*16K of sideways RAM that is addressed from &8000 to &BFFF. THIS EXTRA RAM IS NOT AN EXTENSION OF MEMORY FOR BASIC.

RA32+	£58.00
WPS+	£5.00

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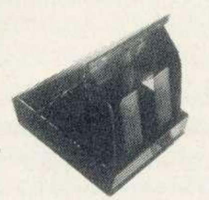
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SOLIDISK FOUR MEG BOARDS MAKE THE BBC MICRO ONE OF THE FASTEST MACHINES YOU CAN BUY

Fit your BBC micro with a Solidisk Four Meg board, and run the PCW BASIC benchmarks in 7.13 seconds, and the PCW Spreadsheet benchmark (with Inter-Sheet) at 312 cells/second.

If you are serious about your business throughput or your "Elite" status, check the effect of Solidisk Four Meg boards. They use a totally new concept for expanding your BBC micro, both in RAM/ROM capacity and in speed.

The newer ROMs have more capacity, 32k as used in the BBC Plus and 64k as in the Communicator. They are also faster and consume far less power than the older 16k and 8k ROMs.

There are four high-capacity Sideways ROM sockets on a Solidisk Four Meg board. You can use a 64k chip in one of them and 32k chips in the other three. Together with the four ROM sockets on the BBC motherboard, you can then fit up to 224k of Sideways ROM into your BBC computer.

Sideways RAM and Shadow RAM haven't been forgotten. The Solidisk Four Meg board can have them too. You can choose either zero or 32k of RAM. The latter can be used either as Shadow RAM or as two banks of Sideways RAM.

Thus, the Solidisk Four Meg boards offer more capacity and yet occupy less space than other boards offering only Sideways ROM/RAM expansion.

In addition, the new Solidisk 256k board offers the Four Meg feature, together with up to eight banks of Shadow RAM and eight banks of Sideways RAM.

But the real plus feature is speed. The Solidisk Four Meg boards make the BBC micro outstandingly fast.

They have a switchable 2 or 4 MegaHertz superfast CMOS 6502 processor. At 4 MHz, the machine can produce up to twice the throughput of a standard BBC B, BBC Plus 64k or BBC Plus 128k. Witness the PCW BASIC and Spreadsheet benchmarks.

Compared with a standard IBM-PC (17.6 sec) and a standard BBC micro (14.6 sec), a Solidisk Four Meg board enables the BBC to run the BASIC benchmark in just 7.13 seconds, putting it amongst the fastest micros that you can buy today.

It is comfortably ahead of a BBC with the Acorn 6502 Second Processor (9.58 sec), and only marginally slower than an IBM-PC AT (TM) (7.11 sec) and a BBC with the Acorn 32016 Cambridge Co-Processor (6.88 sec).

Using Computer Concepts Intersheet to run the Spreadsheet benchmark for speed of recalculation, the Solidisk Four Meg boards enable the BBC to achieve the highest published score amongst microcomputers: it can recalculate more than 24 rows × 13 columns per second (312 cells/sec) by comparison with LOTUS 1-2-3 (89 cells/sec.) or even SYMPHONY (TM) on the IBM-PC (97 cells/sec).

Besides serious applications, the Solidisk Four Meg boards are simply great for computer games. You should just see the stunning graphics and response at 4MHz to realise how good your BBC Micro is. If you don't believe us,

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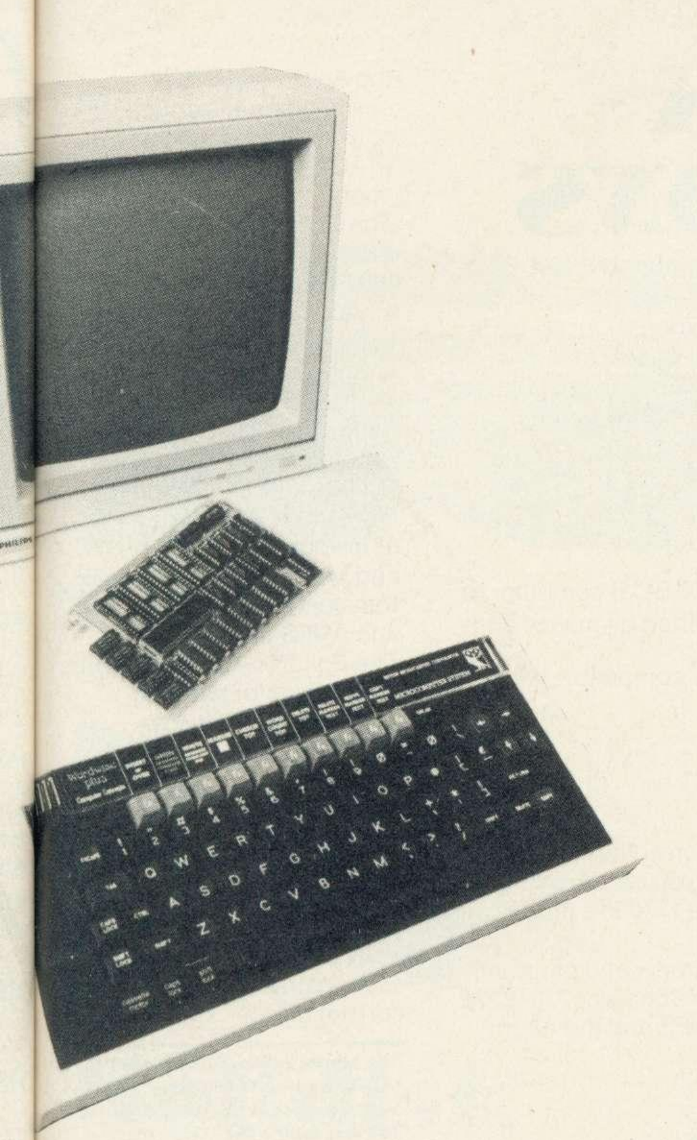
The basic Four Meg boarc costs £30.00 inclusive of VAT.

The 32k version comes with software in ROM and on 5 diskettes, and costs £69.00 inclusive of VAT.

The Solidisk Four Meg boards are intended for the BBC Model B only and can be used with existing Solidisk Sideways RAM boards. However, they are not compatible with any other Sideways RAM/ROM boards, or Shadow RAM boards — which they can replace.

The Solidisk Four Meg boards are securely mounted on the original processor socket, and the additional connections may be made either by sprung clips or by soldering.

The sideways ROMs and RAMs built onto the BBC motherboard are not switchable to 4 MHz.



Solidisk 256K Board

Largest and fastest in the range of memory upgrades for the BBC computer is the Solidisk 256k board. This has 256k of RAM, four high-capacity ROM sockets and a superfast 4 MHz 6502 processor. Both the 256k of RAM and the four ROM sockets can run either at 2, or at 4 MHz — twice the speed of the standard BBC B or the B Plus.
It comes with Wordwise Plus, the best-selling wordprocessor from Computer Concepts, and the Solidisk 32k Manager ROM. This latter can allocate the RAM between Shadow RAM, which acts like that on the BBC Plus, Sideways RAM, for holding images of ROM software, and a RAM disc, which can be of up to 200k.

The Hardware

The 256k RAM is divided into eight banks of 32k bytes, which can each be used as Sideways RAM or as Shadow RAM.
Shadow RAM is usually 20k, but may be increased to 30k, to enlarge the RAM available to the user — eg to hold a bigger document or worksheet.
Sideways RAM is usually 16k, but can be 31k to increase the amount of code held in a single bank. Software which occupies two ROM slots in a standard machine may now be re-written into a single ROM slot, thus becoming shorter in size and faster in operation.
If need be, each bank can be shared between the two, i.e. the bottom as Shadow and the top as Sideways RAM, the border line being controlled by the application software.
The four high-capacity ROM sockets on the 256k board can accept chips of any size from 8 to 64k. 32k chips can be configured either as 31k of continuous code or two independent levels of 16k; "resident" and "backup" (this latter being compatible with the BBC Plus). 64k chips can be divided similarly; one resident — again of either 16 or 31k — and the rest as backups.
The processor is switchable between 2 and 4 MHz. At 4 MHz, the machine can produce up to twice the throughput of a standard BBC B, or B Plus, 64 or 128k.

The Manager ROM

This enables the 256k RAM board to be used for VDU screen record/playback, printer/sound buffer, Basic variable storage, or as a RAM disk.
The Manager ROM also contains a toolkit of programming utilities to list variables, edit, find and exchange strings, check, move, salvage, expand, join and renumber programs, load, save and set function keys, report program status, turn cursor and sound on/off, set sound volume etc.
Shadow RAM may be selected by *SHADOW, followed by a mode change, or by FX114, 128 to FX114, 255, exactly as on the BBC B Plus. However on the latter, arguments 128 to 255 all select the same, single Shadow RAM bank, while on the Solidisk 256k board, they can select between up to 128 Shadow RAM banks (if they exist).
As with the earlier Solidisk SWR32, 64 and 128, a group of Sideways RAM banks can be used as a RAM DISC — now of up to 200k. RAM disc is set up by *RAMDISK <drive>. This stimulates a disc drive, now under not only the Solidisk 2.0 DFS but also — for the first time — ADFS. This operates faster than even the Solidisk Winchester.
The Manager ROM makes the 256k board even more versatile. RCAT displays both "resident" and "backup" firmware. Resident firmware includes all ROMs installed in the BBC motherboard, plus all Sideways RAM banks containing ROM images. The command SELECT causes code to be copied from a backup to a Sideways RAM bank, thus making it "resident".
These features provide potential for further developments in software for the BBC Micro — including integrated suites of business applications, such as Computer Concepts' "Inter-" family.

With the most useful RAM capacity, and the doubled speed, the Solidisk 256k board is perfect for the present, while having huge potential for the future.

Prices, inclusive of VAT

The 256k board comes with the Wordwise Plus ROM and manuals, and Solidisk Manager ROM and manual.

Outright	£175.00
Upgrade from SWR 32	£123.00
Upgrade from SWR 64	£89.00
Upgrade from SWR128	£75.00

The 256k boards are securely mounted on the original processor socket, and the additional connections may be made either by sprung clips or by soldering.

THE SOLIDISK - DISC SOLUTIONS

Solidisk can offer you the widest possible choice in hardware and in software. Our 1770 and 1770+8271 disc interfaces are of the finest design, and supported by excellent software. Solidisk DFS and ADFS are highly acclaimed by BBC experts. Our 80-track double-sided floppy disc and high-capacity Winchester drives are the fastest and have the lowest power consumption. The quality of support and the competence of our 90+Local Experts and technicians are unquestionable. So when you shop around, insist on the Solidisk label.

The Solidisk 1770 Disk Interface

The Solidisk 1770 Double Density Disk Interface enables the standard BBC B computer to use floppy disc drives. It has only four components, which are easily fitted by novice and expert alike.
The Solidisk 1770 Double-Density Disc Upgrade (Issue 2) is now fully compatible with the Acorn 1770 DNFS and the Acorn ADFS ROMs.

The Solidisk 1770+8271 Disc Interface

In order to enjoy double density operation, as well as retaining maximum software compatibility with older disc software (which only runs with the 8271), you can now fit the Solidisk 1770+8271 Disc Interface. You can select either the 8271 or the 1770 at a flick of a switch.
It is intended for the BBC Model B already fitted with an 8271 Disc Upgrade, and plugs into the 8271 socket, with the 8271 being transferred to the new board. The Solidisk 1770+8271 Disc Interface (Issue 2) is now fully compatible with the Acorn 1770 DNFS and the Acorn ADFS ROMs.

The Solidisk 2.0 Disc Filing System ROM

This ROM can be used with either 8271 or 1770 Disc Interfaces (Acorn or Solidisk). It has every facility that you would expect, such as disc formatter and verifier, automatic 40/80 track switching, single/double density sensing and programmable track stepping (to suit almost any type of disc drive).
Additional features and utilities include unlimited file catalogue, Read-After-Write (for higher reliability), text editor, memory editor, disc sector editor, whole disc copier, tape-to-disc, download, read and write a track and recover and restore sectors (for recovering corrupted discs).
Even when working with the 1770, it can run all Acornsoft games (such as Aviator, Elite, Revs, Magic Mushroom etc), and most other protected disks (such as Castle Quest, Island's Music System etc.).
It also has several advantages over the Acorn 1770 DNFS ROM including:
1) The option of double-density operation, which gives 60% more storage capacity, i.e. 640k on a double-sided 80-track diskette, as opposed to only 400k.
2) A better emulation of the older 8271 floppy disk controller: some protected disks (such as the early versions of Acornsoft's Elite game will not run with the Acorn 1770 DFS.

These features make the Solidisk 2.0 ROM the most versatile DFS software you can buy.

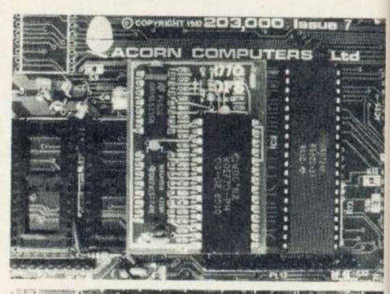
The Solidisk Advanced Disc Filing System ROM

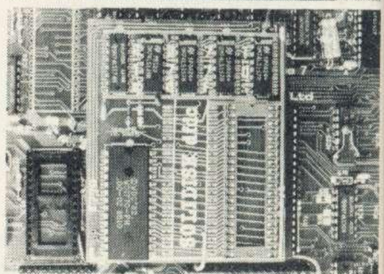
This ROM-set can be used on the BBC Plus and the BBC Model B fitted with a 1770 Disc Interface (Acorn or Solidisk). It is available as an upgrade for your existing DFS ROM in one 32k or two 16k ROMs.
The Solidisk ADFS was reviewed in A & B Computing, October 1985. Whilst comparable to the Acorn ADFS, it is designed for maximum DFS software compatibility (PAGE=& 1900 with one file open).
The Solidisk ADFS will run most software available for the BBC computer, including all Acornsoft languages and the View family and Computer Concepts Wordwise and the Inter-family.
Additional commands include OPEN <number of files> to reset PAGE appropriately, while MVDFS and MVADFS provide direct transfer of files between DFS and ADFS discs.
The Solidisk ADFS is equally convenient for use with floppy and hard discs.
Utilities such as FORM40, FORM80 (for single-sided drives), FORM160 (for double-sided, 80-track drives), VERIFY are provided for floppy discs, whilst BYE used on a hard disc makes a copy of the root directory, to assist recovery in the event of corruption.

The Advanced Disk Filing System (ADFS) is now officially launched by Acorn, and is already revolutionizing software for the BBC Micro. The Solidisk enhancements make it obviously preferable.

Prices, inclusive of VAT

2.0 DFS ROM and manual	£10.00
ADFS+DFS ROM set and manual	£20.00
Upgrade from 2.0 DFS to ADFS	£10.00
1770 Disc Interface, 2.0 DFS ROM and manual	£45.00
1770 Disc Interface, ADFS, DFS ROMs and manual	£55.00
1770+8271 Disc Interface, 2.0 DFS ROM and manual	£50.00
1770+8271 Disc Interface, ADFS, DFS ROMs and manual	£60.00







Solidisk Disc Drives

Solidisk 5.25 inch disc drives are of the latest half-height design, with 80 tracks and double-sided, giving a capacity of 1 Megabyte (unformatted). Features such as automatic spin-up, steel band positioning and a new head mounting system ensure correct centering, consistent tracking performance and long service life of the disc.
The use of a direct-drive motor and the latest VLSI circuitry results in exceptionally low operating noise and power consumption. Therefore two such drives can be powered reliably by the BBC micro.
They are enclosed in strong steel casings, coloured in elegant beige, to protect the high-precision mechanism. The power and data leads are fitted with appropriate connectors, to suit the BBC computer.
With each disk drive purchase, Solidisk provide five volumes of useful software, each on a separate diskette, and a User Manual.

Volume 1

Solidisk Word Processor and Spelling Checker, with English dictionary. You enter by *WP <filename>, and then start typing. Wordstar-like commands make it easier to use than Wordwise, View or Scribe. What you see on the screen is what will be printed. The most useful commands are displayed at the top of the 80 column screen. It provides on-screen justification, automatic margin, insert/overwrite, search and replace, word count, word frequency count, free space, *commands and page numbering. Block operations include move, delete, copy, print, load to cursor. The Solidisk Word Processor has the unusual ability to spellcheck your document without leaving it, simply by typing Control-U.

Volume 2

This contains the Solidisk Database. It uses an 80-column display, is completely menu-driven, can be easily customised and allows datafiles as large as the filing system permits.
You enter the database with Shift-Break, and select one of the 15 options, each leading to a sub-menu. Datafiles can have an unlimited number of records, each with up to 15 fields of up to 60 characters. You can search, sort, view, print using tabulation, print labels, print forms, edit and delete, calculate on fields, merge databases, mailmerge etc.

Volume 3

This contains the Solidisk spreadsheet. Also using 80-column display and menu-driven, it has options to create, edit, recalculate, and print etc. Spreadsheets can have unlimited numbers of rows and columns. Each column can be from 2 to 70 characters wide. All the BBC Basic maths functions are available.

Volume 4

This contains the Solidisk MACRO language. It is Control, TAPE to DISC. DZAP, MZAP and SILEXIGEN, a dictionary generator for the Solidisk Spelling Checker together with a sample French dictionary.

Volume 5

This contains the Solidisk MACRO langauge. It is capable of generating a Basic program using PROCEDUREs, FUNCTIONs, MACROs and machine code routines contained in other programs.
Using the Solidisk MACRO language, you can extract useful parts of existing programs to set up your own MACRO libraries, then use them later on as building blocks for new programs.

The Solidisk computer case

This compact steel case is coloured in beige and especially designed to hold the BBC micro and two Solidisk disc drives. It will support even a heavy-weight monitor, while providing good cooling for the power supply and concealing many connecting cables.
The keyboard is housed in a separate case, connected by a 24 inch flexible data cable. It is ½ inch lower than the original case, does not skid about on the desk and makes a lot of difference to typists (even two-fingered ones!).

Prices, inclusive of VAT

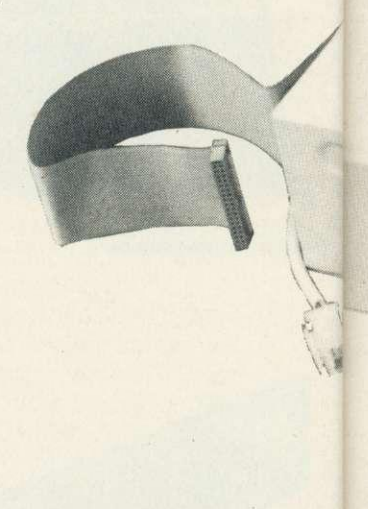
Solidisk 80-track, double-sided disc drive unit with software and manual £109.00
Dual 80-track, double-sided disc drive unit with computer and separate keyboard cases, software and manual £230.00
Computer and keyboard case alone .... £ 30.00

We reserve the right to change prices and specifications without prior notice.

A COMPLETE SOLUTION TO BUSINESS COMPUTING

Suitably equipped, your BBC Micro is an excellent computer for the office. It can run wordprocessor, database, spreadsheet etc better than many other business machines. It can also communicate with other micros and mainframe computers, either directly or via a MODEM.

Solidisk has selected the best in business software, disc drives and printers to form the Solidisk Office System, based upon the BBC Model B or the B Plus. With the Model B, a Four Meg board or a 256k expansion may be fitted along with a 1770 or a 1770+8271 disc interface. Both models can have a Winchester hard disc connected.



The Solidisk Wordprocessor, Disc Drive and Printer Package

The Wordprocessor is the famous WORDWISE PLUS — the best selling wordprocessor from Computer Concepts. Various reviewers speak of WORDWISE PLUS as very user friendly, flexible, straightforward or simply excellent (1). With it, you can write letters and longer documents, and change them to your satisfaction before printing. If you need many similar letters or standard forms, you need only write them once. Wordwise Plus can search and replace any word or phrase, and also mailmerge.

The 5.25 inch disc drive is of the latest half-height design, with 80-track double-sided, giving a net capacity of 640k bytes per disk (in double density). The diskettes are industry standard, readily available and low in cost. The power and data leads are fitted with appropriate connectors, to suit the BBC computer.

The printer is a 9-needle dot-matrix, with a speed of 160 characters per second in normal mode and 32 characters per second in Near Letter Quality mode. Features include multiple pitch settings, italics, boldface, underline, super and subscript, bit image graphics etc. It uses the same ribbon and control codes as the Epson FX85(2).

All manuals and accessories like printer ribbon, printer cable and paper, and a blank diskette are included, so that you can start right away. The package also contains a list of other selected software and hardware available from Solidisk.

Other possible applications

The Solidisk Office System can do more than just wordprocessing. To complement WORDWISE Plus, five volumes of useful software are provided, each on a separate diskette, including Spelling Checker, Database and Spreadsheet programs. You can use the database for mailing lists, customer records, stock inventories etc and the spreadsheet for cheque book balancing, budgeting and forecasting. The database is powerful enough to do important work such as processing all the Solidisk customer records (over 50,000).

However, you need not be limited to the bundled software, but can easily increase the power of the system with, eg a spreadsheet such as Inter-Sheet, a business graphics such as Inter-Chart, or a database such as Viewstore, for more demanding applications. With this last you can, for example, set up a datafile of 30,000 membership records of a video club and have any or even all fields indexed. You can then display them in sorted order, retrieve any record instantly with a few keystrokes, and have a report printed on most popular titles, age groups, takings etc. Such a large database requires a disc drive of very high capacity which in practice is a Winchester disc. Even if your present needs are not as large as this, it is nice to know that this system can grow tith you.

(1) See reviews in E & CM, CEEFAX, Acorn User.
(2) Solidisk own direct imports from Japan, subject to change without notice for improvements.

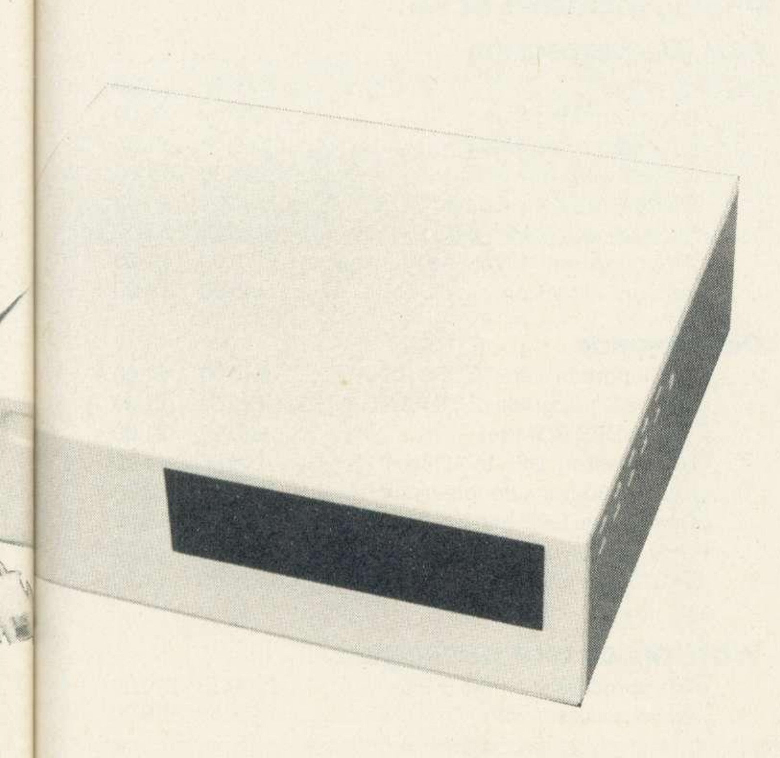
Prices

The Wordprocessor, disc drive and printer package i available for the BBC mod B Plus or the Model B fitte with disk interface. This includes:

- WORDWISE PLUS RO keystrip and manuals.
- one double-sided 80-track disc drive.
- one 160 cps printer.
- five software diskettes and manuals.
- all leads, blank diskette and 100 sheets of fanfo paper.
- one year guarantee.

The complete package costs £269.00 plus VAT.

Owners of BBC Model B's can purchase a Solidisk 1770 disc interface and a 2 DFS ROM, together with t above package, at a speci price of only £299.00 plus VAT (saving £10.00).



THE SOLIDISK WINCHESTER DISC DRIVE

The drive has a capacity of 20 Megabytes formatted. Both single- and dual-drive models are available.

Two key advantages of Winchesters over floppy discs are higher capacity and faster transfer rate.

Unlike floppy disc drives, Winchester drives are enclosed in sealed casings, allowing very high track density, up to 600 compared with 40 or 80.

Their discs are non-removeable, rotating continuously at high speed (3600 rpm), enabling data to be transferred 20 times faster than single-density floppy discs.

The Solidisk Winchester drive has a further advantage over some competitors. It has "buffered seek", hence stepping pulses can be as short as 2 microseconds. This results in an average access time of 80 milliseconds — less than one-hundredth of some other drives. This is especially important as the Winchester fills up, for example when used with a large database.

Hardware requirements

To use a Solidisk Winchester, you will need either a BBC Plus or a BBC model B, fitted with a 1770 Disc Interface (Acorn or Solidisk). The Winchester drive is connected to the 1MHz bus socket.

Software compatibility

The Solidisk Winchester drive is normally used under the Solidisk ADFS, which allows file sizes up to 512 Megabytes and provides a hierarchical directory, permitting an essentially unlimited number of files.

The Solidisk ADFS will run most software available for the BBC computer including all Acornsoft languages and the View family, and Computer Concept Wordwise and the Inter-family. In particular, ViewStore is well suited for databases on Solidisk Winchesters.

All the Acorn Second Processors (6502, 32016 and Z80) are largely compatible with Solidisk Winchesters. Applications such as System ADE running on the 6502, PANOS on the 32016, BBC Basic (Z80) and CP/M (with new HD ROM and HD BIOS) on the Z80 are compatible.

However, software that is not compatible with ADFS will not run.

Prices

The Solidisk Winchester packages consist of:

- One or two Winchester drives, enclosed in a steel casing. The drives come already formatted and loaded with the Solidisk "Initial Software" package, containing a collection of useful programs, such as CATALL, EXALL, ARCHIVE etc.
- A utility disc containing the SAFE program which allows recovery of a corrupted disc.
- A Solidisk ADFS+DFS ROM-set.
- A set of manuals.

Three models are available:

1) 20 Megabytes without its own power supply, but uses that of the BBC Micro ....£575.00+VAT
2) 20 Megabytes with its own power supply ....£650.00+VAT
3) Dual 20 Megabytes with its own power supply .£999.00+VAT

The minimum model is only suitable for use with BBC computers fitted with the current, switched-mode power supply and one Solidisk low power floppy disc drive.

The Linemaster ROM and Modems

The Solidisk Linemaster ROM allows the BBC Micro to communicate with other computers. In addition to the standard Terminal and Prestel modes, it has Viewdata Host Mode and the ability to autodial and autoanswer, all controlled by software.

In Terminal mode, your BBC micro acts as a terminal to other computers, either locally by a serial cable link or remotely, via a modem and telephone line, eg bulletin boards. It supports various BAUD rates and protocols, and has elapsed time clock, 40/80 column screen display etc.

The Prestel mode is designed for accessing the British Telecom Viewdata service. The facilities include tagging, searching and displaying pages, sending and receiving text and downloading software from and to disc.

A special feature of the Solidisk Linemaster ROM allows you to set up your BBC Micro as a Viewdata host. In this mode, other users can communicate with your computer exactly as with Prestel. You can edit pages, make up routing instructions, collect responses etc.

The Solidisk Linemaster Communication ROM works well with all BABT approved MODEMs such as the WS2000, the Nightingale etc but many MODEMs do not support all the features of the Linemaster ROMs. The Telemod 1 for example offers only 1200/75 baud, and is therefore only suitable for communicating with Prestel (or other Viewdata hosts).

Solidisk local experts

Solidisk has a nationwide network of more than 90 local experts and a growing number of experts overseas.

They do not sell our equipment but can generally fit it for you free of charge. If you would like to take advantage of this unparalleled service, ring Solidisk Sales Office.

If you wish to call at our office, please make an appointment.

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(16 lines)

ORDER BY MAIL: Please complete (or copy) this coupon and send it to:

Solidisk Technology Ltd, 17 Sweyne Avenue, Southend SS2 6JQ

Prices, inclusive of VAT

RAM/ROM expansion

Qty		Price	P&P
....	Basic Four Meg board	£30.00	£1.00
....	Four Meg board with 32k RAM	£69.00	£1.00
....	SWR32 with software pack 1	£53.00	£1.00
....	SWR64 with software pack 1	£80.00	£1.00
....	SWR128 with software pack 1	£125.00	£1.00
....	256k board with WW+ and Manager	£175.00	£1.00
....	'Ashtray' extension	£15.00	£1.00

DISC upgrade

....	1770 upgrade with 2.0 DFS ROM	£45.00	£1.00
....	1770+8271 upgrade, 2.0 DFS ROM	£50.00	£1.00
....	ADFS+DFS ROM set	£20.00	£1.00
....	Upgrade from DFS to ADFS+DFS	£10.00	£1.00
....	Solidisk 80-track double-sided	£109.00	£3.00
....	Dual drives, CPU and keyboard case	£230.00	£6.00
....	CPU and keyboard case alone	£30.00	£6.00
....	EFS for the Electron	£59.00	£1.00

Wordprocessor package

....	Wordprocessor for the B Plus	£309.35	£10.00
....	Wordprocessor with 1770 DFS	£458.85	£10.00

Winchesters

....	20MB without PSU	£661.25	£10.00
....	20MB with PSU	£747.50	£10.00
....	40MB with PSU	£1148.85	£10.00

Modems

....	Linemaster ROM and manual	£10.00	£1.00
....	Telemod 1 (BABT approved) MODEM, with Linemaster ROM	£50.00	£3.00
....	Other MODEMs	POA	

Datalife Diskettes

....	MD525 box of 10	£16.00	£1.00
....	MD557 (2S/4D)	£25.00	£1.00

Eproms

....	2764-25 to clear 20 pcs	£25.00	£1.00
....	27128-25 (or better) pack of 5	£25.00	£1.00
....	27256-25 (or better) pack of 3	£25.00	£1.00
....	UVIPROM Eprom programmer	£19.00	£1.00
....	UVIPROM32 for our 27256's	£21.00	£1.00
....	UVIPAC Eprom eraser	£20.00	£1.00
....	Solidisk Toolkit ROM	£10.00	£1.00
	Total	....	....

Name: ....

Address: ....

....

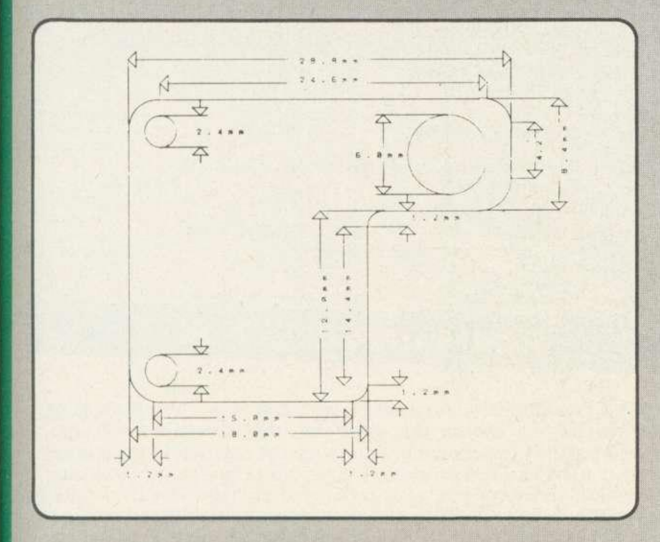
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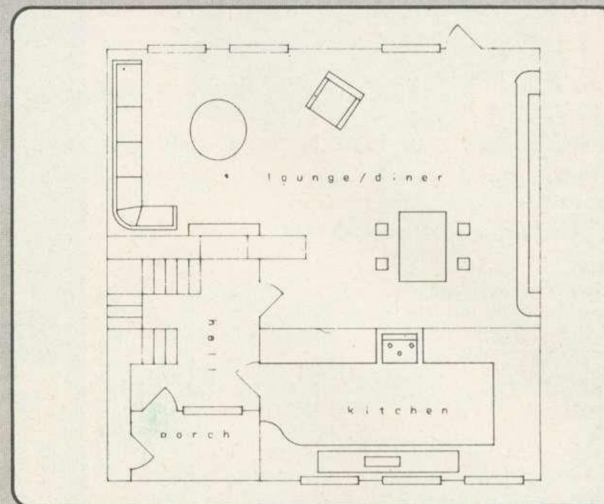
BARCLAY

ACCESS

We reserve the right to change prices and specifications without notice. If you wish to call at our office (Mondays to Fridays 9.30am to 5.30pm), please ring for an appointment.

NOVACAD
Computer Aided Draughting for the BBC Micro





A sophisticated CAD package with unique facilities which until were confined to custom built CAD packages.

Whether you want to draw a complex electronic circuit diagram or plan your new kitchen or simply draw a cube NOVACAD will help you do it better and more easily.

All you need is a BBC micro model B fitted with Acorn DFs and a single disc drive. If you have a 6502 2nd processor and a dual disc drive then NOVACAD's capabilities are further enhanced.

* Very user friendly with all commands and controls from the keyboard. Special windowing techniques make available to the user almost one million dots allowing a lot more detail to be put on the drawing than one would normally expect the BBC to be capable of. (Mode O screen display only 1/6 the number of dots). The drawing can be 4 windows across and 5 up.
* Libraries of user defined ICONS such as electronic symbols can be created easily and edited even in the middle of drawing another diagram. ICON size is not limited to a number of pixels. An ICON can contain up to 500 lines, so complete drawings or sections of large drawings can be saved as ICONS for use with other drawings.
* ICONS can be called by name from a library into any part of the diagram and can be moved, enlarged, reduced, rotated in 90° steps and have mirror images made before being finally positioned.
* The zoom facility allows the user to magnify any section of a drawing by up to 20 times to make it easier to insert details.
* User definable grid helps the user set his own scaling for the drawings.
* Horizontal and vertical displacements can be measured in any user defined scale.
* Any two colour can be used in mode 4.
* Up to '8 levels' can be used to produce multi layer drawings, and then user can decide which levels are to be displayed. This can be particularly used in pcb drawings, architectural drawings with details of the services behind the walls displayed only when required and many other such applications.
* Text can be added at any position vertically or horizontally.
* Use of 2nd processor will allow use of 4 colours, higher pixel density drawings and considerably faster operation. (NOVACAD without the 2nd processor is faster than any other CAD package we have seen for the BBC).
* Powerful delete facilities allow deletion of single lines or whole sections with minimum of key presses.
* Printer dump for Epson compatible printers incorporated in the software which allows a full or a sectional screen dump.
* An optional plotter utility will allow output to a range of popular plotters for high quality diagrams.

NOVACAD will prove to be an invaluable teaching aid in technical schools and colleges and for anyone involved in draughting it will be an ideal labour saving tool.

NOVACAD package with 16K ROM, Utility disc and a comprehensive manual £79 (c).

Novacad compatible with Tracker Ball/AMX Mouse £99 (c)

Upgrading of existing ROMs and DISCS £20 (d).

Plotter Utility Program £28.50 (d)

BBC COMPUTER SPARE PARTS (Carriage code (d))

Complete Keyboard	£52	6502A 2MHz CPU	£6.50	UPD7002	£5.00	74LS163	£0.75
Power Supply Unit	£52	65CO2 CMOS CPU	£12.00	DS3691	£3.50	74LS244	£0.80
Keyswitch	£1.75	6522 VIA	£3.50	7438	£0.40	74LS245	£1.10
Keyboard Connector	£4.50	6522A 2MHz VIA	£5.50	74LSOO	£0.24	74LS373	£0.90
Video ULA	£18.00	LM3 24 op-amp	£0.45	74LSO4	£0.24	74LS393	£1.00
Serial ULA	£14.00	SAA05O-Teletext	£9.00	74LS10	£0.24	8271	£48.00
UHF Modulator	£4.50	6845SP CRT Controller	£6.50	74LS123	£0.80	88LS120	£3.00

TECHNOMATIC

01-208 1177

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Tel: 01-208 1177
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Tel: 01-723 0233
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Prices are subject to change without notice

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(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

PRINTERS

ALL PRINTERS HAVE A 12 MONTH GUARANTEE

EPSON DOT MATRIX PRINTERS: EPSON — the high quality range of dot-matrix printers that set the standard in the industry. A wide range of interfaces ensure that these top-of-the-range printers can be used with most computers.

RX 80T **£169 (a)** RX 100 **£305 (a)**
FX80 (std) **£245 (a)** FX80+ **£299 (a)**

NEW FX105 (NLQ facility) **£449 (a)**

Epson LX-80 NLQ: A new low-cost high performance dot matrix printer from Epson. Its many features include Near Letter Quality, Draft mode, programmable characters, a variety of print styles, graphics etc. Supplied with friction feed.

LX-80 **£209 (a)** Optional Tractor Feed **£20 (c)**

Epson JX80 ColourA full colour dot matrix printer with colour text and graphics as well as many advanced printer features.

JX80 4 Colour **£435 (a)**

KAGA NLQ PRINTERS
Kaga KP810. A top quality yet very competitively priced printer with a Near Letter Quality mode. Includes all the features of Epson FX80 and uses the same control codes. Extra socket provided on the pcb for installing either 8K RAM or 8K EPROM for custom made font.

KP810 (80 col) **£229 (a)** KP910 (156 col) **£339 (a)**

SEIKOSHA SP-10000
A low cost attractively packaged printer includes many novel features including NEAR LETTER QUALITY mode and automatic single sheet loading. Variety of fonts, 100 cps, both friction and tractor as standard.

Seikosha SP-1000 **£159 (b)**

CENTRONICS GREAT LITTLE PRINTER: A new compact printer from Centronics featuring full Epson compatability, NLQ mode, a variety of fonts, graphics, and both centronics and serial interfaces fitted as standard. Friction feed as standard. **GLP £109 (b)** **Tractor Feed £15 (c)**

BUFFALO 32K Buffer for EPSON PRINTERS

This compact 32K buffer can be fitted internally on any EPSON printer within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions. **Buffalo 32K Buffer £75 (d)**

DAISY WHEEL

BROTHER HR15: * 14 cps * 3K Buffer * Two colour printing * Proportional spacing * Underline * Bold * Shadow print * Super/Sub script + many other features.

BROTHER HR15 **£285 (a)**

JUKI 6100: * 15 cps * 2K Buffer * Switchable 10/12/15 cpi * Proportional printing * Linear Motor for max reliability.

JUKI 6100 **£279 (a)**

PERIPHERAL & COMPUTER SHARERS

We now offer an extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	36V36-3 **£69 (c)**	25V25-3 **£64 (c)**
4 Computers to a Printer	36V36-4 **£85 (c)**	25V25-4 **£74 (c)**
2 Computers/2 Printers x-over	36V36-X **£69 (c)**	25V25-X **£69 (c)**
BBC Cable Set 3 to 1 (1m ea.)	**£32 (c)**	**£34 (c)**
BBC Cable Set 4 to 1 (1m ea.)	**£39 (c)**	**£41 (c)**

Computer Sharer:
1 computer to 2 printers fitted with Cable for BBC TCS26 **£19.50 (c)**

HITACHI 672 PLOTTER

Up to A3 on OHP or paper with 4 colours. Its low inertia plotting system, which moves both the paper as well as the pens, gives high acceleration, and therefore high throughput, from a compact economical mechanism. Features both HP graphics language or single character commands. Both parallel and RS232 interfaces as standard. Step size 0.1mm. **Hitachi 672 Plotter £465 (a)**

PRINTER ACCESSORIES

EPSON
FX80 plus sheet feeder **£129 (b)**;
LX80 sheet feeder **£49 (b)**
Paper Roll Holder **£17 (d)**
FX80 Tractor Attachment **£37 (c)**

Interfaces:
8143 RS232 **£28 (c)**;
8148 RS232 + 2K **£57 (c)**;
8132 Apple II **£60 (c)**;
8165 IEEE + Cable **£65 (c)**.
Serial & Parallel Interfaces with larger buffers available.

Ribbons: RX/FX/MX80 **£5.00 (d)**;
RX/FX/MX 100 **£10 (d)**;
LX80 **£6 (d)**
Spare pens for HI80 **£7.50/set (d)**

KAGA TAXAN: RS 232 Interface + 2K buffer **£78 (c)**;
Ribbon KP810/910 **£6 (d)**

JUKI: RS232 Interface **£65 (c)**;
Spare Daisy Wheel **£14 (d)**;
Ribbon **£2.50 (d)**;
Sheet Feeder **£182 (a)**
Tractor Feed Attach **£129 (a)**

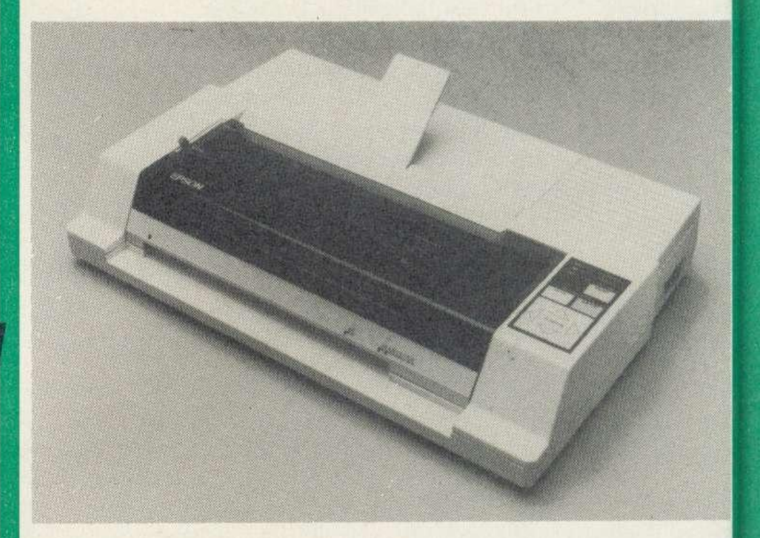
BROTHER HR15: Sheet Feeder **£189 (a)** Tractor Feed **£99 (a)**
Ribbons Carbon or Nylon **£4.50 (d)**;
Red Correction Ribbon **£2 (d)**

BBC Printer Lead:
Parallel (42") **£7 (d)**; Serial **£7 (d)**
Printer Leads can be supplied to any other length.

Plain Fanfold Paper with extra fine perforation (Clean Edge):
2000 Sheets 9.5" × 11" **£13 (b)** 2000 sheets 14.5" × 11" **£18.50 (b)**
Labels per 1000s: Single Row 3½" × 1 17/16" **£5.25 (d)**
Triple Row 2-7/16" × 1 7/16" **£5.00 (d)**
Dust Covers: FX80 **£5.50 (d)**, FX100 **£7.50 (d)**, Kaga KP810 **£6 (d)**, KP910 **£7 (D)**

EPSON HI-80 PLOTTER

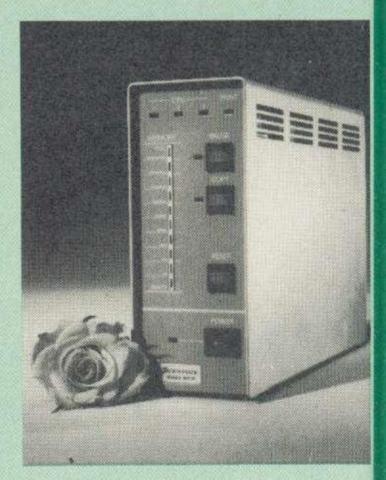
EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer. Detailed leaflet on request. **Epson Hi-80 Plotter £345 (a)**



PRINTER SHARER/BUFFER

A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.



TSB 64 Buffer/Sharer **£199 (a)**
BBC Cable Set **£30**

MONITORS

All monitors supplied with BBC lead

MICROVITEC

All 14″ monitors now available in plastic or metal cases, please specify your requirement.

14″ RGB
1431 Std Res **£185 (a)**
1451 Med Res **£225 (a)**
1441 Hi Res **£385 (a)**

14″ RGB with PAL & Audio
1431 AP Std Res **£199 (a)**
1451 AP Med Res **£275 (a)**
These monitors can receive TV programs thru a Video Recorder

Swivel Base for Plastic 14″ Microvitecs **£20 (c)**

20″ RGB with PAL & Audio
2030CS Std Res **£380 (a)** **2040CS** Hi Res **£685 (a)**

KAGA TAXAN 12″ RGB

VISION II Hi Res **£210 (a)** **VISION III** Plus **£330 (a)**
SUPERVISION III Plus **£330 (a)**

MITSUBISHI

14″ RGB Med RES IBM & BBC Compatible **£229 (a)**

MONOCHROME MONITORS:

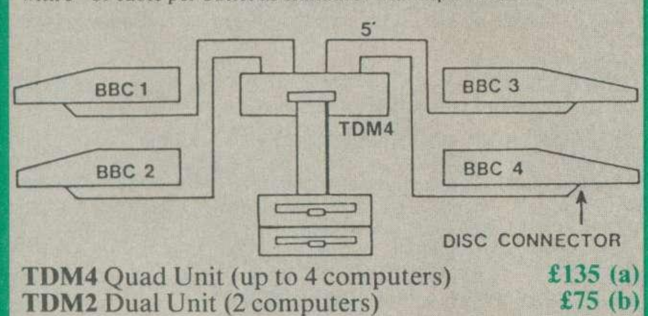
SANYO DM8112CX Hi Res 12″ Green Screen **£86 (a)**
KAGA KX1201G Hi Res 12″ Etched Green Screen **£92 (a)**
KAGA KX1203A Hi Res 12″ Etched Amber screen **£105 (a)**
PHILIPS BM7502 12″ Hi Res Green Screen **£75 (a)**
PHILIPS BM7522 12″ Hi Res Amber Screen **£79 (a)**
Swivel Base for Kaga Monochrome fitted with Digital Clock **£21 (c)**
Monitor Plinth for the BBC **£9.75 (b)**
Double Tier Plinth for BBC and flat pack dual drive **£19.50 (b)**
BBC Leads Kaga RGB **£5(d)** Microvitec **£3.50 (d)**
Monochrome **£3.50 (d)**
Multi Output Video Adaptor: Allows up to 4 RGB Monitors to be connected to the BBC. Fully buffered **£48 (d)**

TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational market. Supplied with a users handbook and utilities disc containing starter programs and development software. **Touchtec 501 £260 (b)**

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5′ of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers) **£135 (a)**
TDM2 Dual Unit (2 computers) **£75 (b)**

DISC ACCESSORIES

Single Disc Cable **£6 (d)** Dual Disc Cable **£8.50 (d)**
DISC STORAGE CASES
10 Disc Library Case **£1.80 (d)** 30 Disc Case **£6.00 (c)**
10 × 3½ Disc Box **£3.50 (d)**
LOCKABLE CASES
40 Discs **£14 (c)** 70 Discs **£15 (c)** 100 Discs **£16 (c)**

DISC DRIVES



Your computer installation can look like this with our PD800P drive

This highly successful drive offers unique features:

New slimline Mitsubishi mechanisms with ultra low power consumption (only 8 watts per mechanism), front locking lever and capable of single or double density operation. Ultra fast track access times and head settling times.

40/80 switchable with switches located on the front panel. A generously rated switch-mode power supply ensures reliability with minimum heat dissipation for long periods of operation.

The mechanisms are set inside a sturdy monitor stand painted in 'BBC-matching' beige. Its 'looks' are enhanced by its black front panel, with attractive enamel-white markings.

These disc drives with a built-in monitor plinth provide a compact installation and give a professional look to the system.

As with all standard TECHNOMATIC drives it comes complete with a data cable, a mains lead with a suitably fused 13A moulded plug, manual and a formatting disc.

PD800P 2 × 400K drive £260 (a)

Other TECHNOMATIC drives are housed in smart metal casings painted with BBC beige colour and are supplied complete with data and power cables ready for connection to the computer. Drives with mains power supply are fitted with a mains lead and a suitably fused 13A moulded plug.

All drives are fitted with the new model Mitsubishi mechanisms and are supplied with 40/80T switches as standard and at no extra cost.

Single Drives:
1 × 400K 40/80T DS: **TS400** **£99 (b)**
PS400 with psu **£120 (b)**

Dual Drives: (with integral psu) Stacked Versions:
PD200 2 × 100K 40T SS **£195 (a)**
PD800 2 × 400K 40/80T DS **£199 (a)**

3.5″ Drives:
These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives come complete with cables, manual and formatting disc.

TS35 1 × 400K 80T DS **£99 (b)**
TD35 2 × 400K 80T DS **£172 (b)**

3M FLOPPY DISCS

Authorised Distributor
Data Recording Products



Industry standard high quality discs with guaranteed error free performance for life. Discs in packs of 10:

5¼″ DISCS
40 T SS DD £13 (d) 40 T DS DD £18 (d)
80 T SS DD £22 (d) 80 T DS DD £24 (d)
£1 extra pack for library case packing

3½″ DISCS
80 T SS DD £30 (d) 80 T DS DD £38 (d)

DRIVEHEAD CLEANING KIT

The **FLOPPICLENE** drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits.
Floppiclene with 20 disposable cleaning kits. **£14.50 (b)**

TECHNOMATIC

01-208 1177

BBC Computer & Econet Referral Centre

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London NW10 1ED

RETAIL SHOPS
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London NW10 1ED
Tel: 01-208 1177
(close to Dollis Hill ⊖)

West End Branch
305 Edgware Road
London W2
Tel: 01-723 0233
(near Edgware Road ⊖)

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Prices are subject to change without notice

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

COMMUNICATIONS

MINOR MIRACLES WS2000 A world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. **WS2000 £125 (c)** BBC Serial Cable **£7.**

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line **£30 (d).**
BBC User Port cable (for modem control) **£4.**

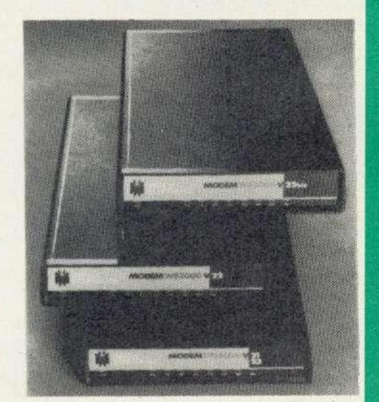
SKI KIT (Allowing total control of the modem by your computer) **£10.**

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols for autodialling **£10.**

WS2000 Auto-Answer Card £30(d).
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

DATA-BEEB An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. **£22 (d)**

NEW WS-3000 RANGE — the new professional series. All are intelligent and 'Hayes' compatible, allowing simply 'English' commands to control its many features. All models feature Auto-Dial with 10 number memory, Auto-Answer, Speed Buffering, printer port, data security option etc. All models are factory upgradeable.



WS3000 V2123 (V21 & V23 + Bell) **£295 (a)**

WS3000 V22 (as above plus 1200 baud full duplex) **£495 (a)**

WS3000 V22bis (as above plus 2400 baud full duplex) **£650 (a)**

The WS3000 range all have BT approval.

CONNECT-3000 AN ESSENTIAL UTILITY FOR THE WS3000 OWNER — a dedicated control package specially written to optimise the potential of the WS3000 series of modems. It provides a friendly menu-driven 'front-end', for the superb but rather complex multitude of facilities of the 3000 — no need to remember register nos. or complex command codings etc. It provides easy control for Prestel, Terminal, Auto-Answer/Dial use, while a unique 'default' facility provides automatic, pre-defined screen presentation. Works in conjunction with ALL communication software, including Commstar, Data-Beeb, Termulator, Termi, Communicator etc.
40/80 Disc £16.50 (d) **ROM £19.50 (d)**

BUZZ BOX This pocket sized BT approved modem complies with V21 300/300 baud and provides an ideal solution for communications between users, with mainframe computers and bulletin boards. Suitable for use with Open University computer. Battery/mains powered.
Buzz Box £55 (c) Mains Adaptor **£10 (d)** BBC Data Lead **£8 (d)**

COMMSTAR An ideal communications rom for both Prestel and bulletin boards. Facilities include Xmodem, clock etc. **£20 (d)**

TERMULATOR An advanced terminal emulator on a 16K Rom. Emulations include VT52/100, Tektronix 4010 etc. Allows a BBC to be used as a terminal for almost any mainframe computer or computer network. **£25 (d)**

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£49 (d)**

RS232 Solutions (Book) **£15.95 (c)**

REAL-TIME CLOCK CALENDER

A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as extensive software including a simple demonstration diary/planner application program on disc. **£29 (c)**



EPROMER II



A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.
Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

* Integral power supply ensures no power drain from the computer.
* Interfaces through 1 MHz bus, fully buffered.
* Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
* Eproms upto 16K (27128) programmed in single pass.
* Selectable programming voltage 25/21/12.5V
* Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
* User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
* Full screen editor with HEX/ASCII input.
* Data input from keyboard/Tape/Disc/Eprom.
* Software interface for integration of user's special requirements.
* Constant display of all options selected.
* Several BBC BASIC programs can be entered on a single eprom.
* Checksum facility allows for easy identification of programmed roms.
* Enter OS Commands from within the epromer program.

EPROMER II with Manual & Software on disc **£99 (b)**
ROM based software **£10**

UV ERASERS

UV1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. **£59 (b)**

UV1B as above but without the timer. **£47 (b)**

ROM/RAM EXPANSION SYSTEMS

ARIES B-32 BOARD: Features 32K of RAM and a 16K ROM socket. RAM can be configured as 20K or 16K as shadow RAM and 12K or 16K or 32K sideways RAM. New commands include comprehensive sideways ROM/RAM management system, simplified direct access to screen RAM and the ability to move/swap the contents of any area of memory. ROM/RAM management system allows RAM allocation, list ROMs, load sideways RAM, disable ROMs, and extend any buffer including printer buffer.

AIRES B32 RAM BOARD **£79 (d)**
AIRES B12 ROM BOARD **£40 (d)**
ARIES B12C Adaptor Board for B12 **£7.50 (d)**

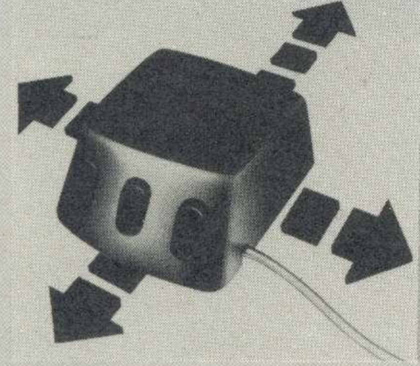
ATPL SIDEWISE ROM EXPANSION BOARD A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sideways rom expansion to 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board **£37 (d)** Battery Backup Kit **£18 (d).**

ATPL Board for BBC PLUS 10 × 16K ROMs **£29 (d)**

COMPUTER VILLAGE CV-16 Rom Board **£38 (d)**

RAMROM-15 The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. No soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. Battery back-up fitted as standard. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. **£79 (b)**

AMX MOUSE with SUPERART



The mouse will now be available with enhanced software, the 'SUPER ART' which is compatible with 6502 2nd processor, the ARIES RAM board, BBC+ shadow mode, tape and ACORN DFS and ADFS. Allows full use of colour in mode 1. Disc users can create colour pictures in A4 size with dot resolution by scrolling the screen window. Other facilities include, colour pattern editing, use of icons, additional text styles, superb zoom in colour.

There is a variety of optional software to make the mouse one of the most versatile peripherals that can be added to the BBC micro.

AMX Mouse with Super Art £69 (d)

AMX Super Art Package on its own £43 (d)

AMX PAGEMAKER provides a high resolution A4 Typesetting and Artwork system. £47 (d)

AMX 3D ZICON will let you transform three dimensional vector data and translate them into 3D on screen graphics. £21 (d)

AMX DATABASE is a new filing system with 1000 records per file and unlimited number of fields per record. £21 (d)

AMXXAM This program enables you to create multiple choice exam papers which can include pictures created on ART, building the finished pictures into quiz etc. £21 (d)

AMX Original ART + Utilities package £11.50 (d)

AMX DESK £21 (d)

MARCONI RB2 Tracker Ball with icon master £52 (b)

ACORN TELETEXT ADAPTOR £125 (a)

ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £278 (a)

DATABASE MANAGMENT SYSTEMS

GEMINI DATAGEM features include * almost unlimited file size (max 10Mbyte) * supports up to 4 drives * Max of 5000 records per file * max 6K record size * max of 62 fields * generates form letters from records.
Please ask for leaflet. £49 (c)

VIEWSTORE An exciting, powerful database with many features: Display can be 'spreadsheet' or 'card-layout' type. Powerful selection and sorting utilities. Any screen mode can be used. Data can be sent to View and ViewSheet. Maximum file size 4096MByte! Maximum record size 60K. £44 (d)

STARdataBASE A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. Its printer configuration suits any BBC compatible printer. £49 (d)

MASTERFILE II The new version of the popular general purpose file management system. It allows large amounts of information to be stored and processed. It is extremely powerful yet flexible to use. It allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. Typically, using 5 fields, about 2000 records may be stored on a 100K disc. This latest version features many new facilities including use with WORDWISE/VIEW £17.00 (d) Disc (80 or 40T).

CP/M SOFTWARE FOR TORCH & ACORN Z80 PROCESSORS

We can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors.

Please phone for our new professional software catalogue

WORDSTAR PROFESSIONAL The advanced word processing package comprising of WordStar, MailMerge, StarIndex and SpellStar, a total combination offering substantial savings on individual prices. WordStar is the best selling word processing program on the market. Extensive operator aids include a comprehensive yet friendly manual, step-by-step training guide, command cards, on-screen menus with four levels of help messages etc. etc. SpellStar checks text files against its 20,000 word-plus dictionary. You can both add to the dictionary and create specific supplementary ones. Mailmerge is ideal for mailing applications where lists are selected on a range of criteria. It enables the fast production of personalised form letters, mailing labels, invoices, etc. StarIndex creates alphabetical indexes, tables of contents, paragraph numbering and much more.

WORDSTAR PROFESSIONAL £299 (a)

WORDSTAR £275 (a) MAILMERGE £145 (a)

DBASE-II Undoubtedly 'The Database', can be used for an almost limitless number of business applications, ranging from mailing list preparation and maintenance through to running accounting ledgers and payrolls. In addition to standard database features it provides much more. An on-disc tutorial takes you from setting up a simple file all the way through to setting up custom screens and reports. Automatic calculations may be performed on data, and fields or entire databases may be modified or replaced with single, English-like basic commands; Dbase-II can therefore be used by general personnel having no programming knowledge. It can be tailored to suit a variety of professions and individual needs, with files such as accounting, payroll, time billing, job costing, scheduling and mailing lists. It can access several files at a time. It is fast, flexible and powerful. £315 (a)

SuperCalc-II The powerful spreadsheet with advanced features. Full documentation with lessons are provided. £299 (a)

SAGE — packages include accounting, payroll etc. please phone for details.

Pro-Pascal A full implementation of the International Standard for Pascal (ISO 7185) apart from the optional conformant parameters feature. In addition to the standard features of Pascal, Pro Pascal includes: dynamic strings for character and string manipulation, 9 digit integers and random access file handling for data processing applications, single and double precision floating point arithmetic, an assembler level interface for systems programmers, and separate compilation of program segments for building libraries of commonly used procedures and enabling very large object programs to be constructed. Pro Pascal is a 3 pass compiler, converting a source program into efficient Z80 machine code. The package includes a compiler, run-time library, link editor, library manager and cross referencing utility. £299 (a)

BSTAM A telecommunication facility used for transmitting any size CP/M file. £149 (b)

Other packages available include CIS-COBOL, INFOSTAR, DMS +, FMS, SAGE, ATITUTORIALS, MACRO-80 etc. Please telephone with your requirements.

A.T.I. Trainers — from American Training International. These superb interactive training discs simulate the package being studied. A unique screen technique provides a friendly interaction — in the upper area, a faithful reproduction of the screen is displayed, while at the bottom, a series of prompts and explanations lead the student through the exercise. ATI trainers available include Wordstar, dBase-II, dBase-III, Multimate, Multiplan, Word. at £75 (b). Please phone for other trainers.

PROFESSIONAL SOFTWARE PUBLICATIONS

(no VAT on books)

Wordstar made easy	£16.95 (c)	Understanding dBase-III	£20.95 (c)
Introduction to Wordstar	£14.95 (c)	Multiplan Made Easy	£18.95 (c)
Wordstar Handbook	£11.95 (c)	Multimate Complete Guide	£15.95 (c)
dBase-II for the first time user	£18.95 (c)	ABC of LOTUS 123	£13.95 (c)
Understanding dBase-II	£17.95 (c)	The RS232 Solution	£15.95 (c)

TORCH GRADUATE IBM SOFTWARE

We are able to supply most popular software packages including: WORDSTAR, WORD, EASY-WRITER, DBase-II & III, LOTUS-123, VISICALC, SAGE etc. Please telephone with your requirements.

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(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

ROMs/SOFTWARE

WORD-PROCESSORS

VIEW Acorn's version V2.1 word processor rom. £41 (c)

VIEW VERSION V3.0 Also compatible with BBC + Complete with Printer Driver Generator. £69 (c)

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. £36 (c)

VIEW INDEX Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. £10 (d)

VIEW PRINTER DRIVER GENERATOR: Create a driver for any printer. £7.50 (d)

WORDWISE £28 (d)

WORDWISE PLUS The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. £41 (d)

WORDEASE A rom based utility for the Wordwise plus. £24.50 (d)

SPELLCHECK III A 16K rom based program for View and Wordwise plus. Contains 2000 words on the rom and 6000 (expandable to 17000) on disc. £31 (d)

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. £41 (d)

INTERSHEET The new spreadsheet from Computer Concepts. Many advanced facilities including 105 character display, several spreadsheets may be used at once, may be used with View & Wordwise etc. etc. £42 (c)

INTERCHART Graphics Package for the Intersheet. £27 (d)

ULTRACALC £49 (d)

QUICKCALC £14.50 (d)

LANGUAGES

META-ASSEMBLER (full details on page 1) £126 (c)

ACORN P-SYSTEM A portable operating system supplied complete with USCD PASCAL and FORTRAN 77. £249 (b)

6502 DEVELOPMENT PACKAGE A Macro-Assembler with utilities for use with the 6502 2nd Processor. Enables the serious programmer to develop large programs in assembly language. £32 (d)

ACORN MICRO-PROLOG: The logic programming language seen as the language for programming in the future and used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more user friendly for new users. 16K Rom, manual and extension modules. £69 (c)

ISO-PASCAL Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. £46 (a)

ISO PASCAL Stand ALONE GENERATOR £30 (d)

ACORN LOGO A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. £46 (b)

LOGOTRON logo £57 (c)

BCPL A full implementation of the BCPL compiler language consisting of the language of ROM, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. £46 (b)

BCPL CALCULATIONS PACKAGE Supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calcultion files, example files and a comprehensive user guide. £17.30 (d)

BCPL STAND ALONE GENERATOR £32 (d)

ACORN LISP Rom £34 (d)

FORTH £34 (d) **COMAL** £34 (d)

MICROTEXT The authorising system from the National Physical Laboratory. Disc £53 (b)

G:FORTH An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. It incorporates an editor, 6502 assembler, very fast turtle graphics and supports extensive string and file handling. It contains 540 predefined words including those for reading joystick ports, produce sounds, set and read the time and produce random numbers. £30 (d)

OXFORD PASCAL A fast, compact P-Code compiler, that fully utilises BBC Graphics and sound, contains a powerful editor, and produces 'standalone' software. £35 (c)

UTILITIES

ACORN BASIC EDITOR £21 (d)

ACCELERATOR From Computer Concepts — Finally, a comprehensive compiler that will compile existing BBC Basic programs, simply, and in most cases, without alteration. Compiles to either intermediate code or machine code. Supplied with two Roms, manual, utility disc etc. £42 (d)

SPEECH ROM From Computer Concepts — allows infinite speech with the Acorn speech system using simple * commands. Pitch and emphasis can be altered — even singing is possible! £24 (c)

SPEECH PROCESSOR ROM £12 (d)

DISC DOCTOR Computer Concept's popular disc utility ROM which adds 20 commands to the DFS system. £24 (d)

ACORN GRAPHICS ROM GXR £22.50 **(specify BBC B or BBC B PLUS)**

PRINTMASTER The ROM that features the most versatile screen dumps for the Epson MX/RX/FX80 and KAGA PRINTERS. Includes mode 7, magnification, character definition, enlarged text, etc. — in short — this ROM does it all! £23 (d)

BROM The new utility ROM from Clares — a Toolkit ROM that gives you full screen editing. Many extra functions are included. £24 (d)

REPLICA II 40 & 80 Track Versions available. £9 (d)

REPLICA III £12.50 (d)

EXMON-II Advanced M/C Monitor. £22 (d)

TOOLKIT plus a 16K ROM with many advanced features including Syntax checker, Basic Editor, Autosave, etc. £33 (d)

ROMIT Helps create RAM disc and puts BASIC and assembler programs into eprom. £28 (d)

SLEUTH Basic Debugger £21 (d)

CREATIVE SOUND £14 (d)

HELP II Advanced version of the original HELP rom. £27 (d)

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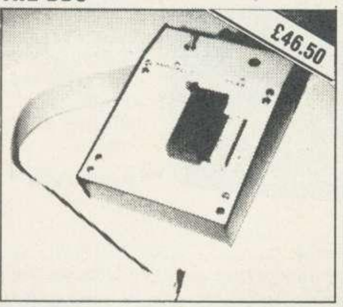
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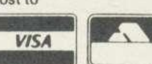
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HINTS & TIPS

Martin Phillips considers the problem of colour blindness, includes a utility to list ROMs and presents a help page creator

CLASHING COLOURS

Not long ago colour was a novelty on a micro but now it is seen as essential, and many programs rely heavily on its use.

One issue that gets little or no mention is that of colour blindness. About 1 in 30 males is colour blind, and many are unaware of it. About 95% of colour blind people are males, and most cases are inherited. Although such people have different colour sensations, they can usually make some distinction between different colours, usually by some slight difference in brightness. Most people have only some degree of colour blindness, the most common type being blindness to red or green.

White light, and all other colours, can be produced from just three primary colours – red, green and blue (more correctly a bluish-violet colour) – hence the term 'RGB' to indicate the three colour signals sent to a colour monitor. Mixing these three colours in nearly equal proportions will give white.

When black is placed against white or vice versa they 'set one another off', and the black looks blacker and the white a purer white than if either were placed against a coloured background. It is also true that blue against yellow is more vivid than if placed against any other colour, and in the same way green is enhanced by red. It is difficult to design a program with the right colour combinations for maximum legibility. Listing 1 can help. It displays each possible foreground and background colour combination (except where they are the same). As each combination is displayed, the user must select a number from 1 to 3 to assess its legibility. The results are stored and displayed either on the screen or to a printer, in a form that is easy to check.

I tried this on several people and found a considerable variation in the results, some colours being more acceptable than others. Obviously the type of display being used will have some bearing on opinions, a good monitor providing sharper definition than a colour television. A compilation of acceptable and unacceptable colour combinations would help with program design, especially with teletext pages. We would be grateful if readers, especially those who are colour blind, would send in their results from listing 1.

Colour Contrast Tester

Background colour is blue
Foreground colour is white

Enter legibility level
1 bad, 2 OK, 3 good _

The result of running listing 1. The program is designed to help the colour blind

Listing 1 is straightforward in operation. PROCinitialise dimensions two arrays; 'result$' which stores the legibility number (0 for the same background and foreground colours, and 1-3 for bad to good), and 'colour$' which stores the name of each logical colour number. PROCtest cycles through the combinations, defines a text window at the top of the screen and changes the colours in this window. After the test phrase has been displayed, the text window is removed, and the rest of the printing is done in white on black. PROCprint displays the results on the screen or on a printer. If a printed copy is required, your name and monitor type are requested and printed at the top of the sheet. The results are ordered before being printed.

WHAT'S IN A MACHINE?

With such a variety of ROMs available for the BBC micro it is often necessary to invest in a sideways ROM board to hold them all.

A problem that frequently occurs is that some of the ROMs interfere with each other, or cause odd effects in programs. This frequently happens with the NFS (network filing system) chip fitted to many BBC computers, and often the best thing is to remove this chip completely.

Sometimes the various ROMs have to be moved in relation to each other to get the best compatibility. For example, both Beebug's *Toolkit* and Watford's DFS have a *EDIT command. The *Toolkit* can have all its commands prefixed by a 'B' to get round this problem, but to be able to access both *EDITs it is necessary to put the *Toolkit* in a lower priority socket.

Once all the ROMs are positioned for least clashes, it is useful to keep a record of where they are stored in case they need to be switched out. I have included here a short utility program to list all the ROMs in the machine (listing 2); all it does is to print out the title of each ROM and its location. If more information is needed the *HELP facility can be used.

Listing 2 works by using the OSRDRM call (Operating System Read byte from paged ROM call). This allows a single byte to be read from within a paged ROM. On entry, the Y register should contain the number of the ROM to be read and a vector at &F6 holds the address of the byte to be read. The byte is

returned in the accumulator. The title is held in a string starting at location 9 in the ROM and is terminated by a 0. A check is made on the byte returned before adding it to the title string as there is no reason why such titles should not contain such codes as switching the screen off.

Individual ROMs can be switched off by putting the value of 0 into the location &2A1+(ROM location number). The location number will be in the range 0-15. Language ROMs can be called up by using the *FX142, (ROM location number) call. Thus it is possible to have both versions of Basic in the machine at the same time and call each up by simply using the *FX142 call. If a program is already in memory when this is done, the OLD statement must be used before executing.

HELP FOR THE ASKING

Current software often provides help facilities in the form of special keys which, when pressed, give help with a particular part of the program. This technique frees the user from frequent reference to the handbook and proves useful when one is familiar with the program, but has forgotten the command required.

Help facilities can be implemented on the BBC micro simply by writing help pages into each part of a program so pressing a key will give a page or more of information. The only problem is the text will take up precious computer memory, so reducing the available memory for the rest of the program.

A better way is to use disc memory. There is often a large amount of spare memory left on a disc, and this can be used to store various help files. These can be viewed using *TYPE which can be called up from within a Basic program, without any effect on the program itself. In order to use this facility, there needs to be a means of transferring text from the computer to disc. A wordprocessor program like *Wordwise* is ideal for this. *Wordwise* has a spool text facility, so that the text can be correctly formatted to disc. All that needs to be done is to take a sample of text, make the line length 39 or less, add justification if required, and save to disc using the spool text option. Then put page mode on (VDU14 or CTRL-N), clear the screen (VDU12 or CTRL-L) and type *TYPE JUNK where JUNK is the filename of the spooled file. This will print out the text one page at a time, and pressing the Shift key will allow the next page to be displayed.

This very simple method is satisfactory for straightforward help pages, but there are problems. Adding colour is possible but tedious, adding graphics is also possible but very tedious. Also the file has to be loaded back into *Wordwise* to correct it, thereby making screen layout difficult. To get round these problems, I have included a help page creation program (listing 3) to enable up to 10 pages of help information to be created quickly and effectively on the BBC. Colours, coloured backgrounds and graphics are supported, and double height text is produced at one go. At the bottom of each page there is a page number and a message requesting that the Shift key should be pressed to continue or to finish. It is possible to create new files and to edit or extend existing files. Once pages have been created they can be saved to disc, and then a one line entry in a program will call them up:

VDU 26,14,12:*TYPE JUNK

where JUNK is the filename of the stored text. Page mode must be switched off once the help file has finished, and it is better to switch off the cursor before calling up the file. You can do this by typing:

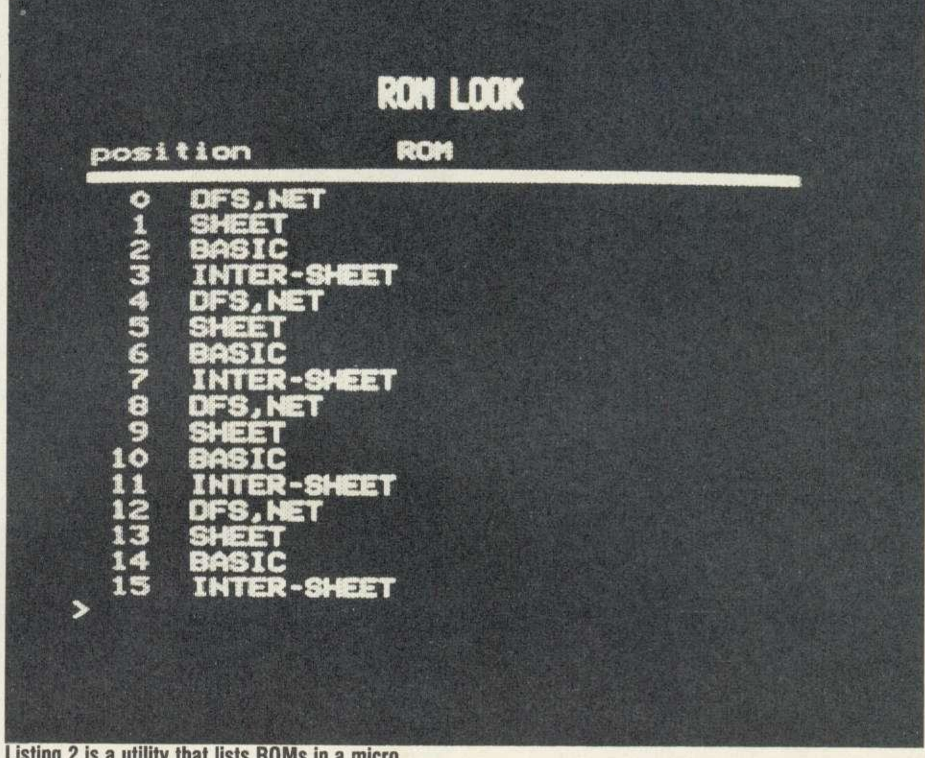
VDU 23, 1, 0; 0; 0; 0;

To switch the cursor back on, simply type:

VDU 23, 1, 1; 0; 0; 0;

Listing 3 has three main procedures. PROCsetup, PROCrun and PROCsave. PROCsetup sets up various elements needed by the program, PROCrun is the main run-loop of the program where the pages are created and edited, and PROCsave saves the finished pages to disc. It is possible to create 10 pages, which are stored consecutively in a byte array M%. This array dimensions 10000 memory locations. Each teletext page is 40 characters wide and 25 lines deep, therefore 1000 bytes are needed to store each page.

It is necessary to clear this memory area, – otherwise, if the program is used to create more than one set of help pages, previous characters will be retrieved. The number 32 (&20) – the ASCII character for a space – is stored in each location.



Listing 2 is a utility that lists ROMs in a micro

Once this has been done, some of the function keys are programmed; the shift+function key and CTRL+function key functions are set by default and are ideal for this purpose. A function key strip is provided to show the function of each user-defined key (figure 1). These are programmed to give characters greater than 128. In line 270, for example, the ¦ part is equivalent to the value 128 and ¦ M gives 13, making a total of 141 – the ASCII character to give double height. Note that line 330 uses the pound sign as the last character. Function keys 8 and 9 are programmed to go forward and backwards throughout the pages and, by the way they are programmed, it is also possible to use CTRL-B to go back and CTRL-F to go forwards. Then the user is given the opportunity of loading an old file back in for editing purposes.

PROCrun is the main part of the program. The procedure first prints the message and page number at the bottom of the screen. The rest of the procedure is a REPEAT . . . UNTIL loop which inputs a keyboard

character and then displays it on the screen. The first problem here was that it is possible to use the cursor keys to scroll the screen, thereby losing the text. So each key has to be tested to see that it does not move outside the screen area. The next problem was the double height key. To be easy to use, the software needs to sense whenever the double height code exists on a line and then print everything twice. This is quite easy while that line of text is being entered, but is more difficult when returning to a line with double height on it. PROCdouble tests whether a line has a double height code on it: the variable 'double' has the value of 1 if the line should be in double height. An extra line (line 770) is needed to cater for deletion of a double height character.

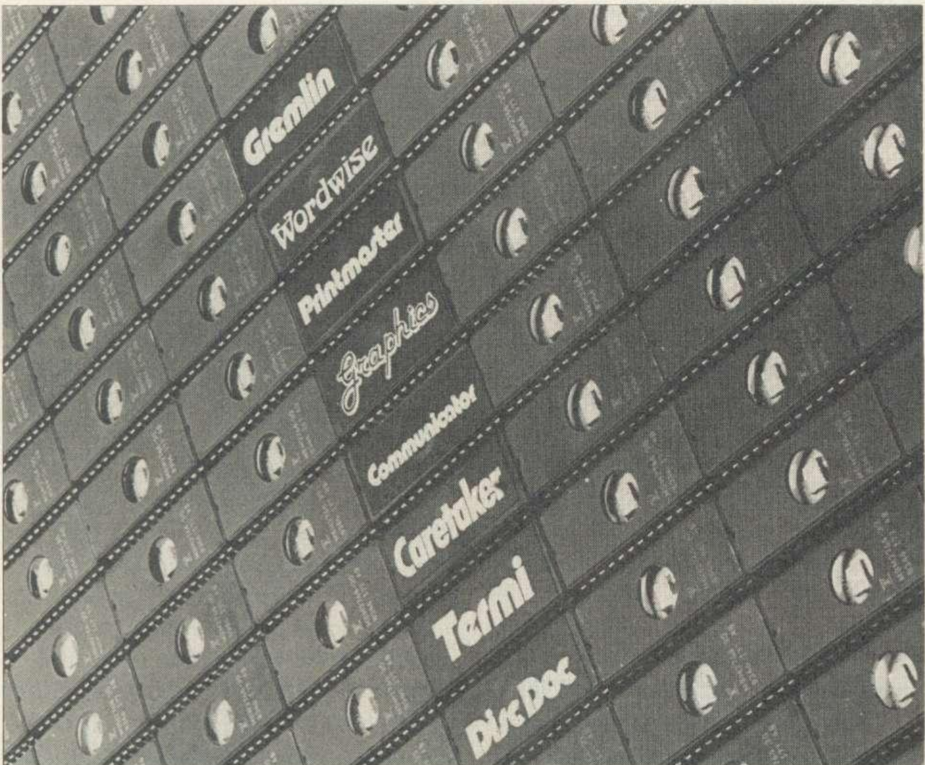
Once the appropriate graphics colour code has been entered, pressing different keys on the keyboard will give most, if not all, of the graphics characters. However, a chart is needed to find each one and, as this can take time, a different approach is called for. The Q,W,A,S,Z and X keys can be used to set or remove the appropriate pixels in the character.

Pressing Return then defines the character. This can be accessed at any time by using a spare key on the keyboard, the Copy key. To enter the character definition function, the CTRL-f0 key must be pressed. PROCchar is the procedure to define the graphics character. It first checks to see if a graphics colour has been entered, and if not inserts the white graphics character. Without this character somewhere in front of the graphics character it would not be possible to define or display a character: text would appear instead.

PROCforwards and PROCbackwards are two similar procedures to move onto the next page or back to a previous page. The procedures test the first character in the bottom line of the page to see if it contains the ASCII code for cyan text. If it does, the procedure assumes that this page has previously been defined. This test is necessary so that the help file is only as long as required and does not contain extra blank pages. For this reason, when creating a text file, do not step on beyond the current page unless it is intended to create the next page of text. PROCstore and PROCretrieve are two similar procedures to transfer the screen memory area to the array and vice versa.

When enough pages have been created, press Shift-f0 to leave the editor and save the pages. PROCsave saves the pages of the help file. Once the title has been entered (no error checks are made, so this should be done carefully) the 'end' message is placed at the bottom of the last line. Then, in the last few bytes left on the page, two ASCII return codes are put in, followed by a clear screen code which ensures that the file will scroll properly when page mode is put on. Lastly, the pages are saved byte by byte. This is rather slow, but it doesn't have to be done too often so it isn't worth looking for an elegant solution.

Martin Phillips' listings can be found on yellow pages 105 to 107



A plethora of ROMs. Listing 2 helps keep them in order

CTRL (Graphics)	SHIFT	Help Page Creator
define	save pages	double height
red	red	single height
green	green	solid graphics
yellow	yellow	separated graphics
blue	blue	black background
magenta	magenta	new background
cyan	cyan	hold graphics
white	white	release graphics
conceal	flash	back a page
	steady	forward a page

Figure 1. Function key strip for use with the help page creation program (listing 3)

FIRST BYTE

SPEED MERCHANTS

No matter how fast computers are, there are always times when you want them to work even faster. And there are many ways of making them do just that

Tessie Revivis

Computers are fast, and the BBC micro is probably the fastest-running micro in its class. The Electron runs at a slightly slower speed than its big brother. But no matter how speedy our micro is, at times we will want it to run even faster.

There are a variety of reasons why this might be the case. Typically to speed up graphics so that they are displayed in 'real' time, eg, for games. Or to sort largish quantities of data, for example to search through a database of names for a specific item.

So how do we actually go about speeding programs up? The BBC is processing information at about two million times per second; the Electron runs at about half this speed. These are often referred to as the cycle or clock cycle time and are normally quoted as 2MHz (megahertz) and 1MHz respectively. The term 'processing information' may be slightly misleading. The heart of your micro is the 6502 chip, which has a very simple set of instructions. The quickest of these will take one cycle to operate. More complex instructions may take two,

No matter how speedy our micro is, at times we'll want it to run even faster

three, four and five cycles to execute, so the actual number of operations per second will range from two million to about 0.5 million per second for the BBC micro, and half this for the Electron.

Obviously we are unable to alter this speed to make our programs go faster unless we plug in a specific peripheral device such as the Watford Electronics Delta Board to do so. What we can do, however, is to write and adapt our programs to make them much more efficient in terms of the amount of time the Basic interpreter spends identifying commands and statements, thus allowing it to get on with the work of carrying out the operation required of it.

To see just how much difference even a minimal change can make, look at listing 1. Here we have two simple loops which both add 1 to a variable 1000 times. The first loop uses a long variable name. The timing loop surrounding the program tells us that it takes 2.75 seconds to carry out the task. Now look at the second loop. This is identical except that it uses the resident integer variables (A% instead of 'incrementing') and it takes just about 0.9 seconds to run – a 200 per cent improvement in terms of speed.

The resident integer variables, ie, A% to

This is not the purists way of programming – totally against the rules – but then speed always has a price

Z% and a% to z% inclusive, are 'known' to Basic. It knows exactly where to find them and can do so quickly. Other integer variables, ie, named ones that have the suffix % are slower as they must be found in memory by Basic. Real variables are also stored in main memory and these are slower still as each requires five bytes for storage of the value assigned to it, and this is coded in a special format that needs to be decoded for use when you are printing to the screen.

Straight away we can see that simply adjusting the variable names within a program can greatly increase its speed. Imagine the total saving in a program of even 5k in length which uses long variable names.

This is not to say that long variable names are bad. On the contrary, if speed is not of an essence then stick with them. A variable called 'screenmode' means a lot more than one called S% when it comes to reading and possibly debugging the program listing.

The best solution is to write and debug your program using long variable names, then finally add the speed by using a suitable utility to replace each variable name with single letter integer one.

Variable names are not only used in simple forms such as in listing 1. Remember that they can also be used in number arrays, and in many cases an even more significant speed increase can be gained. On the subject of arrays, remember that they always start from array 0, not array 1. Use array 0, as the Basic interpreter will have one less to search through than if you had started at array 1.

If you are using single byte values in arrays then byte arrays are much quicker to access and require less space (just a single byte per element) than normal arrays, as shown in listing 2. Experiment for yourself to see.

Storing or moving data to and from parts of memory can be time consuming. Listing 3 illustrates this graphically. The first loop (lines 80-100) pokes the mode 0 screen with &FF a byte at a time. When run it takes 18 seconds to complete the task. Not bad when you consider that it is writing to 20480 separate locations. But single-byte poking is very inefficient. The Beeb and Electron are capable of using the ! (pling) operator to poke four-byte blocks at a time. The routine between lines 150 and 170

```
   10 REM First Byte - Listing 1
   20 REM by Tessie Revivis
   30 REM BBC B/B+/128k and Electron
   40 REM (c) Acorn User February 1986
   50 :
   60 TIME=0
   70 incrementing=0
   80 FOR thisloop=0 TO 1000
   90 incrementing=incrementing+1
  100 NEXT thisloop
  110 PRINT TIME/100
  120 :
  130 TIME=0
  140 A%=0
  150 FOR N%=0 TO 1000
  160 A%=A%+1
  170 NEXT N%
  180 PRINT TIME/100
>RUN
  2.75
  0.89
```

Listing 1. A 200 per cent improvement in speed between the first and the second loop

performs the same task using this method and completes it in just three seconds – which is a sixfold increase!

In long programs that use procedure calls, a speed increase of up to 10 per cent can often be gained by replacing PROC calls with their equivalent GOSUB. This is not the purist's

way of programming – totally against the rules, as it were – but then speed always has a price. There is an exception to this when you want to pass parameters, for example. It is quicker to pass parameters to a PROC thus:

PROCpass (A%, B%, C%)

than it is to use global variables within the program. GOTOs are sluggish, as the Basic interpreter has to look at each line number in turn to see just where the line is. If the line is at the front of the program then it can be quite quick. However, if it's towards the end . . .

```
 10 REM First Byte - Listing 2
 20 REM by Tessie Revivis
 30 REM BBC B/B+/128k and Electron
 40 REM (c) Acorn User February 1986
 50 :
 60 DIM A(255)
 70 DIM A% 255
 80 TIME=0
 90 FOR N%=0 TO 255
100 A(N%)=N%
110 NEXT
120 PRINT TIME/100
130 TIME=0
140 FOR N%=0 TO 255
150 A%?N%=N%
160 NEXT
170 PRINT TIME/100
```

Listing 2. Single byte values in arrays are quicker and need less space

REPEAT . . . UNTIL loops run faster than IF . . . THEN . . . GOTO type loops. Similarly FOR . . . TO loops offer a slight speed increase over REPEAT . . . UNTIL loops, which will generally require at least an extra instruction overhead, for example to increment a loop control variable. FOR . . . NEXT loops can be speeded up themselves by omitting the control variable after the word NEXT. In other words, terminate loops with

NEXT

and not

NEXT X%

If you have several FOR . . . NEXT loops embedded, all ending directly after one another, then use the 'NEXT comma' technique. That is, use

NEXT ,,

rather than

NEXT A% : NEXT B%

An interesting way of gaining some speed, particularly in the case of the Electron, is to disable the keyboard with *FX178,0. Why should this provide more umph? The answer lies in the fact that the operating system, which has ultimate control over your micro, keeps stopping your program several times a second to have a look at the keyboard to see if any keys have been pressed, so that it can insert them into the input buffer for later processing. Obviously, getting rid of this intrusion will speed up the overall running time.

Program lines that involve tests, particularly long ones or several of them packed within a program, can be speeded up. Consider the line:

IF A% = 0 AND B% = 1
C% = 2 AND D% = 3 THEN E% = 4

To evaluate this line Basic has to check to see that four variables all equal the specified amount. A quicker method would be to use several IFs thus:

IF A% = 0:IF B% = 1:IF
C% = 2:IF D% = 3:E% = 4

Now only one condition need be tested at a time and the line will be left as soon as a conditional test fails.

Some Basic keywords are optional. In the above example, THEN can be omitted. Similarly so can variable definitions, where the keyword LET is optional. Removing these words will mean that Basic has one keyword less to evaluate each time.

Spaces and REM statements add to the bulk of a program and as they have to be evaluated each time they are encountered, they slow it down. Removing all REMs and all superfluous spaces will gain some extra speed. Similarly using multi-statement lines, where possible, cuts down the time spent by Basic decoding the start of each line.

Computers are not efficient at maths though it might not seem so. Writing expressions for evaluation in an efficient style will help:

A% = B%/10 + C%/10

is a typical example. It can be written much more effectively as:

A% = (B% + C%)/10

If you need to save or load data then use *SAVE or *LOAD to do so. The single byte BPUT and BGET routines provided are terribly slow, and when used over filing systems such as the Econet often involve an overhead of a couple of dozen bytes.

What we can do is to write and adapt our programs to make them much more efficient

If you wish to move data around the screen display, ie, sprites for games, scrolling letters and so forth, then reading and writing to and from the screen directly (peeking and poking) is very much faster than using the legal VDU and PLOT commands. The trouble here is that your program will not work when used with shadow video RAM or across the Tube. But if this isn't a consideration, it can often make the difference between a moving display working effectively and not.

For some applications you will find it impossible to speed your programs up enough in Basic. At such times you will have to resort to machine code. This does not mean that you have to re-write your entire program in assembly language, just try to evaluate which sections are taking up the processor's time (insert loops that will print the time taken for a particular section of Basic to run) and try to write this in machine code, or extract a routine that does just that from another listing in *AU*. Generally, loops and memory manipulation are slowest. Graphics that are performed legally cannot normally be speeded up significantly, though direct peeking or poking can. Similarly, filing system accesses are limited by the mechanical nature of the devices being used.

```
 10 REM First Byte - Listing 3
 20 REM by Tessie Revivis
 30 REM BBC B/B+/128k and Electron
 40 REM (c) Acorn User February 1986
 50 :
 60 MODE 0
 70 TIME=0
 80 FOR S%=&3000 TO &8000
 90 ?S%=255
100 NEXT
110 T%=TIME/100
120 :
130 MODE 0
140 TIME=0
150 FOR S%=&3000 TO &8000 STEP 4
160 !S%=-1
170 NEXT
180 H%=TIME/100
190 MODE 7
200 PRINT T%,H%
>RUN
  18
   3
```

Listing 3. Moving data to and from parts of memory can be time consuming

If you look at the listings in *Acorn User* you will see that they are rarely optimised for speed, but rather for ease of understanding, and hence they make good examples for practising your speed techniques.

Try taking a listing from the yellow pages and inserting a timing loop as used in the simple examples on these pages. Run the program and make a note of the timing. Then, try each of the techniques outlined above in turn. First remove the REMs at the start and see how much difference this makes. Then shorten procedure names, and so on.

The graphics listings by Jim McGregor and Alan Watt in the past four issues make ideal choices for this. They use excellent procedure names such as PROCdrawmotifat which shorten to something like PROCd – it makes it difficult to understand what the program is doing, but soon starts making an impact on timings. Also notice that if you press a key while a program is running it will increase the timing by a fraction of a second.

A by-product of such techniques is that they not only save time but also memory, which can be especially important for Electron users with the Plus 3 disc add-on which grabs extra memory, as does the ADFS disc chip on the BBC micro.

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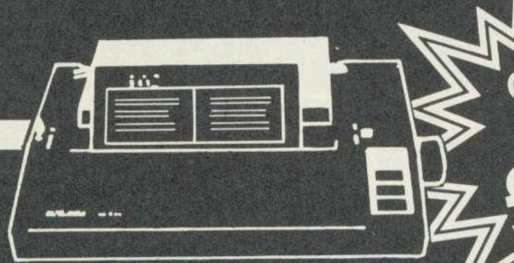
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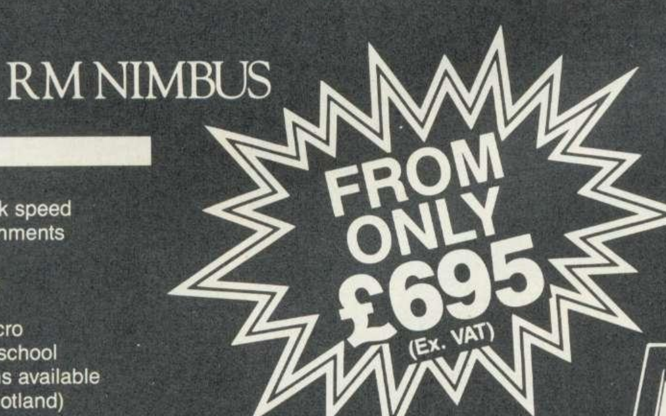


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LETTERS

COMMENTS ON COUPONS

Sir, I am a regular subscriber to *Acorn User* so I feel entitled to make a comment or two.

Coupons. There are at least two locations in the December issue where obligatory coupons are printed with editorial text on the back. For instance on page 93 I cannot enter the competition without mutilating page 92 text. Advertisers' coupons are often backed by text but the inability to use these is only a nuisance.

Central Processing. When answers only are given without implying the question, the answer is a waste of the space – which you always say is so scarce.

Competition answers. I support your reader who asks for more information on how a winner achieves his result. When you have spent many hours trying to answer a competition it would be satisfying to know how it should be done.

I am not sure that I like your new presentation. I was used to the original format, page numbers were more obvious and the print was clearer.

Despite my criticism I enjoy your paper and look forward to it each month.

Francis Aries
Herts

There are very few obligatory coupons in *Acorn User*. The only one we regularly use is for the competition, which discourages multiple entries. Coupons for free ads, reader services, etc, can be copied.

Central Processing answers should include the question, so we apologise for any which have not been clear.

Unlike most other magazines, our competitions are not trivial and Simon Dally often does not have a computer-based solution when he sets the quiz. As we may receive thousands of entries, competitions are set to result in the least amount of extra work for the office. However, we are looking into the possibility of readers submitting separate solutions.

Finally, the redesign. A lot of soul-searching goes on in our offices over how to present information in the clearest and most attractive way. The new look is less cluttered, more pleasing to the eye and is designed to make it easier to find your way around.

To sum up, points taken and we'll try even harder.

STRIPE PITCH GRIPES

Sir, On page 136 of the November issue of *Acorn User*, you ran an advertisement from Newark Video Centre, for a 'high resolution TV/monitor' based on the Grundig P40-125 GB, and claiming a stripe pitch of 0.42mm. On page 174 of the same issue Chris Drage reviewed this model, and repeated the '0.42mm slot pitch, 580 × 680 pixels' figures.

I bought one of these sets from Newark, and found that the slot pitch is, in fact, around 0.55mm – rather better than a normal TV, but barely adequate for 80-column wordprocessing, and not as advertised. I wrote to Newark Video, and received a very apologetic reply from Mr Beeching, saying that he had been misled by Grundig, and could not supply a 0.42mm slot pitch tube. I shall not accept his offer of a refund because the set is still good value.

I accept that Newark's advertisement was worded in good faith, but I am disappointed to have been misled by Chris Drage's article. Either Mr Drage accepted the Newark slot pitch figure without bothering to check it (very easy to do, with a × 10 eyeglass and a test pattern), or his review monitor *was* fitted with a 0.42mm tube, in which case I should like one also.

Graham Roper
Berks

Chris Drage replies: I am disappointed that Mr Roper did not use the test programs when assessing the sets, as these would have given him a far more realistic idea of the strengths and weaknesses of the monitors. We all accept that manufacturer's figures are given in good faith but we must remember they are subject to change at any time. It is not practical to suggest that viewing the castelations with an eyeglass is an accurate means of checking the slot pitch – the inaccuracy is due to the thickness of the glass. The distance between castelations will also vary with the picture width. For example, using Mr Roper's method I ascertain that the slot pitch of the Grundig P40-128 is closer to 0.50mm which is still very good for a TV/monitor and is, as yet, unsurpassed by any competition.

TO RGB OR NOT TO RGB?

Sir, The review of the seven TV/monitors was very interesting especially as I am considering the purchase of the Grundig P40-125. I am a little confused, however, why, when the Grundig is supplied with an RGB input, does the Grundig set require modification and what is the modification that is required?

I ask this as I can purchase the set in London for about £229 instead of the quoted £275, the set being an unmodified one!

Mr Nunn
Middx

Chris Drage replies: Mr Nunn is quite correct when he states that the Grundig P40-125 TV/monitor has an RGB input already installed. Unfortunately, Grundig does not provide any switching arrangement to enable you to use the built-in circuitry. An ad-hoc modification could give you access to the RGB circuit via the socket provided but it would mean having to unplug the lead every time you wanted to use the P40-125 as a television. I don't advise you to do this, however, as the sync signal from the BBC micro is not properly isolated in the Grundig and there is the danger of damaging the sync chip in the computer.

Newark Videos naturally ensures that the sync signal is properly isolated. For the additional £46 you buy considerable peace-of-mind.

TWO INTO ONE WON'T GO

Sir, In his letter in the December issue, J Frank Hughes asserts that if one types A$=STR$(4.7):P.A$ then 4.7 will be displayed, and he states that any machine not doing this must be faulty. There must by now be thousands of concerned BBC micro owners who have discovered that according to this criterion their machine are faulty, as they get 4.699999999 displayed.

They should not worry: this is one of the less well known differences between Basic 1 and Basic 2. Basic 1 will display 4.7 whereas Basic 2 will display 4.699999999. Basic 2 can be made to behave as Basic 1 by setting @% to &100090A rather than the default value of &90A.

The Z80 and 8086 versions of BBC Basic behave in the way Basic 2 does, and both display 4.7.

Richard Russell
Kent

CUNNING CONVERSIONS

Sir, May I as an experienced Econet user cast a little light in the gloom surrounding it?

First, it is true, sad to say, that there is not much software advertised as being runnable on Econet for several reasons. First, as N S Kirby pointed out in his letter (October), it is not always easy for potential authors or publishers to test and develop their software. Second, software suppliers are loath to supply products in a form where they can be copied, and unfortunately this must be possible if the software is to be transferable on to Econet format data discs, or on to a central Winchester storage disc (a problem shared by nearly every form of network installation). Third, there are technical reasons why software may not be suitable for Econet.

The message I would like to hammer home is that most of these problems *are* surmountable. Moreover, there are many advantages to an Econet system which enable you to do things which are impossible on stand-alone machines. For example, in Oundle School where I teach we run introductory courses on using *Wordwise*. With the aid of software developed in the school, we use the network to control all the pupils' micros from a master machine so the teacher can illustrate editing techniques remotely.

Another popular program is the Island Logic/System *Music* package. This I have converted for Econet – incidentally the converted package is for sale by System – and I have added the enhancement of being able to synchronise all the machines on the network together. This allows the playing of multi-part music and we have several such network compositions including a complete Bach *Brandenberg* movement played on 12 machines.

This was an exceptional conversion job requiring several weeks' work, but many commercial programs require minimal changes, once the protection is removed of course! This is a political problem that software suppliers must sort out. It is in their interest to do so, because there is a large market waiting for Econet software.

Many users of Econet do not have the technical expertise or the time to modify software themselves, but it can be done, and it is not always as difficult as it is made out to be. Continual pressure must be placed on suppliers to make them do it, or at least to allow it to be done by those who want to use their software.

There are one or two fairly major technical difficulties inherent in Econet. Again they can be overcome. Perhaps the major one, which Mr Kirby mentions, is the poor speed of Econet when handling data files. This is because the basic PRINT command makes use of the BPUT command, and sends bytes one at a time to the fileserver. This is very time consuming, as each byte has to be accompanied by several others to say where it is coming from, and where it is going to.

It is possible to overcome this using the OSGBPB command to send several bytes at once, but what is really needed is software to buffer locally the output of the PRINT commands, and to send the results in larger hunks to the fileserver.

What is galling is that Acorn has had this facility for some time now, but has made no attempt to pass it on. The solution is to do it yourself, and over the last few months we have developed a ROM which provides such buffering for random access files. We hope that it may be possible to make this available more widely later. A similar looking product from Digital Services is mentioned in the news section of the November *Acorn User*, although I have no detailed information about it.

The second problem Mr Kirby mentions is to do with graphics dumps. The early version of the NFS (3.34) did have problems when used with the Printserver ROM and graphics dumps, but I find that the newer NFS (3.60) contained in the DNFS chip works fine in this mode, and that there is no problem with the print server provided by SJ Research.

Finally, may I offer Mr Kirby access to my school network if he still wishes to develop a network version of his program, and may I draw the attention of other Econet users to a suite of Econet specific utility programs written at Oundle and Felstead Schools which are for sale via the MUSE Software Library, PO Box 46, Hull HU1 2HD.

Robin Newman
Oundle School

HOW NOT TO GET CAUGHT

Sir, The article 'Caught in the network' (October) invites a number of comments. In particular, it was unfortunate that you left S J Research out of the list of network suppliers. The company manufactures fileservers, to stand in place of the usual dedicated BBC micro, which offer total compatibility with Acorn's Econet, plus a number of additional facilities. Its address is 108 Mill Road, Cambridge, CB1 2BD.

Now for some further observations on your article. First, using Acorn's 'bridge', communications between one network and another will be slower than on a single network; in practice a fileserver on each network is highly desirable. Also the bridge requires the two networks to come together at the link point.

Second, the software situation is not (quite) as bad as you suggest; Cambridge University Press in particular markets programs in Econet versions; Heinemann seems to be moving the same way. Many other programs (including the Acorn *Micros in Business* and Acorn/CES packages reviewed in your October issue) transfer easily to the network – but may run more slowly. Acornsoft's support for Econet has been particularly disappointing – although the Microtext publishing system does include an Econet version.

Next, for local viewdata we use Colin Rowling's *Mikefax* which comes in an Econet version, and which I feel is better (and cheaper) than other systems I've tried. This package seems to have escaped your attention to date! It's available from Colin at 2 Tamar Road, Haydock, St Helens, Merseyside WA11 0HR. (We also have a number of patches to this. I would be pleased to send details to anyone on receipt of an sae at Brakenhale School, Rectory Lane, Bracknell, Berks RG12 4BA.)

There are routines to improve data handling without resorting to rewriting programs. SJ has a routine (PutGet) which will, I understand, work on Acorn systems. ME Electronics of 5 Hatherley Road, Reading, Berks markets a more powerful routine (written at Wellington College) which only works on the SJ system!

The copying of ROMs onto the net, and distributing them to sideways RAM, is almost certainly a breach of copyright. (Other copying onto a network may be, too!) In view of the furore raised in September's *Acorn User* I'm surprised this wasn't mentioned.

Meadnet has the advantage of leaving PAGE at &E00.

I would totally disagree with the suggestion that small local networks are preferable to one large network – especially in terms of system administration (but it's essential to be able to control the space allocated to individual users on a large network).

Berkshire's Econet support group has produced a comparison of costs and facilities provided by the various Acorn and SJ fileservers; copies of it can be obtained from me at the Bracknell address above for 60p inclusive.

George Hawes
Berkshire Econet Support Group

LETTERS

WRITTEN AT LAST!

Sir, I suppose, like many readers, I have often contemplated writing to the editor – then done nothing! But this time several points have arisen almost together.

I have enjoyed your magazine throughout 1985. As a new reader and Beeb-owner seeking to satisfy myself and family, it has been highly successful. Your review articles have been most helpful and a constant scource of reference. Hence I am dismayed that you have dropped your clear, bold, quick, reference page numbers for midget lightweight type in the corner – a backward step if ever you made one.

My second carp concerns the December review – 'Working on the Side'. It was just not up to standard, being neither up-to-date nor testing comparable items. It left more unsaid than said.

Now for some positive suggestions: 1) How about a full review(s) of the current sideways expansion ROM/RAM units in terms of physical compatibility? This would be invaluable to those planning expansion without tears.

2) A comparison of the scope of the software support for different sideways RAM systems and their compatibility with Acorn recommendations.

Since the Electron is almost being given away for Christmas, how about an article on using it as a network or as an intelligent terminal link to a BBC B? It might even sell a few more as it is undoubtedly cheaper than a second processor and could afford small business, and even family users, greater value.

Finally, as you have a technical editor like Bruce Smith capable of such clear, useful presentation as the *BBC Micro ROM Book* could we not have more 'how it works' articles? Some of us don't want to go on regarding the Beeb as a magic box forever!

Thank you and your staff, with a special mention of Tessie Revivis for the B.SUM program (what a pity it cannot be on every printed program), for a fine magazine.

P G Browning
Cheshire

Many thanks for the brickbats and the praise. Let's address the sideways RAM issue first. The review examined the most popular options for adding such boards. It did not assess physical compatibility, but we are compiling compatibility charts for RAM/ROM boards (and the chips that go in them), so watch this space.

We carried a series by Paul Beverley on linking the BBC micro and Electron in 1983/4.

This included adding a 6522 chip interface to the Electron (December '83); transferring data from BBC micro to Electron at high speed through this interface (January '84); and adding a parallel printer port (February '84).

As for other applications, Bruce Smith has an Electron set up running a Solidisk 10Mb hard disc. That's one lulu of a system for less than £650!

For articles about how a micro works might we again point you to back issues. A series on this in June, July and August 1984 had a fascinating set of routines so you could see a program in action, with the latter two also showing simple hardware to build. Page 104 of this issue gives details of ordering. We hope these will give you some insight – without taking the magic out of computing.

GRAMPIAN GROUSE

Sir, In his article on the Domesday Project (*Acorn User*, September) Geoff Nairn states that schools in the Grampian Region were 'handicapped by their LEA's decision to plump for Sinclair Spectrum computers'.

The fact is that when schools were first invited to express an interest in Domesday, they were asked to indicate which of the three 'Micros in Schools' machines they would be using. The Project's failure to produce a Spectrum version of the data collection software must therefore be reckoned the first 'handicap' for Grampian schools, *not* selection of the Spectrum computer.

The second, and major, handicap was the Project's failure to make allowance in their timetable for the fact that most Scottish schools go on holiday at the end of June – which was a whole month before the closure date for submitting data.

As a result, there was a mad last minute scramble to enter survey data, and while most schools were able to gain access to a BBC micro, half a dozen late applicants could not be accommodated.

Gavin Bell
Director,
Grampian Educational
Microcomputing Project

Latest round-up of games high scores

Aviator	Acornsoft	30,450	**P Hopgood***
Android Attack	Computer Concepts	1,495,105	**Tim Hedger**
Arcadians	Acornsoft	98,020	**Niaz Islam**
Battletank	Superior	108,500	**Stephen Corcoran**
Castle Quest	Superior	2,240	**Peter Simpson**
Chukkie Egg	A&F	30,275,420	**Stephen Corcoran***
Crazy Painter	Acornsoft	279,790	**Richard Arundale***
Cybertron Mission	Micro Power	715,960	**Niaz Islam**
Fortress	Pace	129,250	**Stephen Corcoran**
Frak!	Aardvark	20,000,200	**Paul O'Malley**
Free Fall	Acornsoft	5,024	**Philip Comber***
Hopper	Acornsoft	52,422	**John Durrans**
JCB Digger	Acornsoft	131,450	**Stephen Corcoran**
Killer Gorilla	Micro Power	836,475	**Stephen Corcoran**
Meteors	Acornsoft	498,500	**P Ludgate***
Missile Control	Gemini	469,225	**Ian Boffin***
Monsters	Acornsoft	283,000	**Stephen Corcoran**
Mr Ee	Micro Power	685,650	**Jonathan Parker**
Moonraider	Micro Power	642,125	**Stephen Corcoran**
Overdrive (BBC)	Superior	338,450	**David Perry***
Overdrive (Electron)	Superior	1,011,720	**P Ludgate***
Painter	A&F	203,690	**Nigel Shaw***
Pengo	Watford	230,310	**Tony Smith***
Planetoids	Acornsoft	3,186,450	**Stephen Corcoran**
Pole Position	Atari	384,250	**Niaz Islam**
Rocket Raid	Acornsoft	161,460	**Roger Austin**
Snapper (BBC)	Acornsoft	1,839,210	**Peter Simpson**
Space Adventure	Virgin	4,890	**Mark Bradshaw***
Starship Command	Acornsoft	8,420	**Ian Boffin***
Zalaga	Aardvark	23,460,500	**Ian Boffin***

**Scores unbeaten since June 1985*

Please say whether your score was notched up on a BBC micro or Electron when sending in your games high scores as in future issues we'll be publishing separate tables for each micro.



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ACORN DNFS KIT	£68.95b
UNLABELLED DISCS – Box 10 80tr d/s 96tpi	£11.95(b)

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VIEW PRINTER DRIVER GENERATOR – Allows you to tailor a printer driver to your own printer. Comes with drivers for FX80, Juki 6100, Olivetti JP101 and others.
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Cassette – **£9.50 (a)**

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HI-VIEW – A disc based version of this popular word processor for the 6502 second processor giving 47k of user memory. **£44.95 (b)**

VIEWSHEET – Acorns spreadsheet rom giving 255 rows by 255 columns, multiple windows, works in any mode, wide use of function keys, fully compatible with View. **£47.95 (b)**

VIEWSTORE – Acorns new database rom. Works in any screen mode, many powerful sorting facilities, can be spreadsheet or user defined card layout. Max record size is 60k. Output can be sent to View and Viewsheet. Comes with comprehensive manual, utilities disc etc. **£54.95 (b)**

GRAPHICS ROM – Acorns new 16k graphics rom giving many new commands for extensive graphics. Circles, ellipses, arcs, rectangles, parallelograms, segments and sectors etc are all available. Comes with manual and utility cassette. State B or B+ version. **£25.00 (b)**

BASIC EDITOR – Acorns new editor rom allowing all the normal wordprocessor facilities to be used on basic programs. Features include block copy, block move and use of labels. **£28.95 (b)**

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ISO-PASCAL – A full implementation of the ISO standard supplied on two roms with two comprehensive guides. 6502 disc version also supplied. **£59.95 (d)**

MICRO PROLOG – A logic programming language for the BBC micro **£69.95 (C)**

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INTERSHEET – The first of the ROM-LINK integrated rom packages from Computer Concepts. Menu driven, 40/80/105 column display, very fast, can be used with View or Wordwise, up to 16 spreadsheet in memory at one time. Supplied on two roms with reference manual, function key strip and quick reference card. **£47.95 (b)**

INTERCHART – The second ROM-LINK package and designed for Intersheet giving Bar, Pie and Line graphs. **£31.95 (b)**

ACCELERATOR – The most comprehensive compiler yet for the BBC micro. Compiles nearly all Basic, including floating point arithmetic. Compiles to intermediate G-code or to machine code. Comes on two roms with manual, disc and quick reference card. **£57.95 (b)**

WORDWISE – The standard BBC word processor still very popular allowing all normal features for low cost. **£35.45 (b)**

WORDWISE-PLUS – The new 16k version of Wordwise giving added commands for better use. Using its own language mail merging, indexing, continuous processing and multi column text can be utilised. **£44.95 (c)**

SPEECH ROM – Using the Phoneme system this allows infinite speech. Both pitch and emphasis can be changed and if wanted it can also sing. Requires the Acorn Speech Processor. **£28.95 (b)**

PRINTMASTER – This rom allows Epson or Star printers to be fully utilised easily. Includes a versatile screen dump, enlarged text, various text manipulation commands **£27.50 (b)**

DISC DOCTOR – Still a very popular disc utility rom giving many extra commands to any DFS. **£27.50 (b)**

GRAPHICS ROM – Computer Concepts graphics rom giving many new graphics commands including Sprites and Turtle graphics. **£27.50 (b)**

BROM – A basic utility rom which includes one of the best basic editors available giving true screen scrolling. Extended error handling which uses the editor, rom management, many useful features. A very good toolkit rom. **£29.95 (b)**

BETABASE – A very useful database program allowing up to 65000 record to be held. Many features include versatile printing, powerful sorting routines, outputs can be compatible with Wordwise or View. **£21.95 (b)**

BETABASE UTILITIES – Adds many more features to Betabase including full disc sort, mail merging and many more. **£11.00 (a)**

REPLICA III – Now enhanced to transfer even more of your tapes to disc. Now uses a data disc so you need only buy one! Even works on the BBC Plus. **£13.95 (b)**

BETA-ACCOUNTS The first of this integrated suite of programs allows Invoices and Delivery notes to be issue. 80 Column editing, sales ledger sheet automatically generated, multiple VAT rates. Can be used with Betabase. **£21.95 (b)**

PROFILE – A procedure library allowing up to 100 procedures on a disc, easy merging of procedures with basic programs. **£11.00 (a)**

FONTWISE – A new font program allowing up to ten different fonts to be used with Wordwise or ascii text using an Epson compatable printer. **£11.00 (b)**

WORDEASE – A utility disc for Wordwise-plus giving many new features to this best-selling wordprocessor. Includes label printing, disc menus, versatile copying routines etc. **ROM £27.50 (b) Disc £18.95 (b)**

HELP II – Now extended to 16k, contains ALL Basic keywords, ALL VDU codes, ALL FX codes. **£29.95 (b)**

SPELLCHECK III – Now even better. 2000 words held in rom, dictionary can contain up to 17000 words on a 100k disc. Much faster than before. Test timings give 2000 wpm. **£34.95 (b)**

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SLEUTH – A comprehensive basic debugging rom. It allows single stepping of basic programs, dual screen facility, breakpoints etc. **£26.25 (b)**

EXMON II – A very advanced machine code monitor which now includes dual screen facility and a full screen memory editor. Also includes single stepping and breakpoints. B/E. **£26.25 (b)**

STUDIO 8 – A music program giving a 4 voice synthesizer, and 8-track digital recorder and rhythm and drum facilities. **£19.95 (b)**

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LETTERS

FLIPPIN' ACORN

Sir, After all I've heard about Acorn, I think they've finally 'flipped'.

They seem to think that the public want a new BBC micro and have totally confused the public.

I am refering, of course, to the two new version of the Beeb, the unsuccessful B+ and the destined to be very unsuccessful 128k B+.

Acorn has already established a large user-base of BBC micro users, and its most sensible route should be to make a new BBC that could have been fully upgraded to by other BBC users who owned the old version. For example, upgrading the Beeb from a model A to a model B.

The best way Acorn could have done this was by incorporating the new 6502 second processor in a BBC micro, and calling this the BBC+.

If this was done, the media would have hearalded the new machine as a breakthrough by making an already fast micro into a superfast micro.

But since Acorn has 'flipped', this now cannot be rectified (the media would not accept it or publicise it).

Now, the best way to keep Acorn out of hiding is to produce a standard 128k upgrade for the BBC micro (like the ZX81 16k RAM pack).

If Acorn go the way they are going now, I am going to be a very frustrated Beeb owner – and I'm sure I won't be the only one.

Sunil Jagota
Newcastle upon Tyne

EXTENSION FOR EXTENSION BOARD?

Sir, We have a SIR extension board for use with the BBC micro, but have lost the original instruction data.

Could you tell me where I could obtain operation information for the SIR. In particular I need information on the necessary settings for links A, B, C, D, E, F, G, H and J; and the application of sockets IC0 to IC11 for use with ROMs and sideways RAMs.

Also, the connection for the flying lead labled 'BBC ROM'?

G H Townsend
London

Chris Drage replies: Unfortunately the SIR ROM board has been out of the market for some time due to the manufacturers going to the wall.

Also, it was not available for the reviews of ROM boards that appeared in *Acorn User* this year.

I suggest that you contact your local computer club – a member might own a manual.

Or can any readers help? A copy of the manual would be most helpful.

HARDWARE CATALOGUES?

Sir, We keep hearing about manufacturers in the computer industry being in financial trouble because they can't sell their products.

A big factor is that the majority of people who are into computers cannot afford to pay cash for the add-ons they would like, and this includes me.

Hire purchase is too expensive, so why can't a mail order system be introduced along the lines of Kay's, Littlewoods, Empire Stores? I'm sure that many people would like to use this method of buying, and the manufacturers would probably sell more equipment.

J B Hackett
Cornwall

OFF-THE-SHELF SOFTWARE

Sir, In reply to a letter from Roy Stall (November) asking for instances where a BBC micro has been utilised in a school library, I have been using a program by an outfit called Aztec.

The kids type in the topic they want and the Beeb tells them which shelf to look at.

I think they are working on a system of bar codes for school libraries but I'm not sure when it will be on sale.

The program we bought was not in any fancy packaging but cost only £8.50 for the disc which seems very reasonable.

You can reach Aztec at 25 St. Mark Road, Deepcar, Sheffield S30 5TF, tel: (0742) 862246.

James Ward
Sheffield

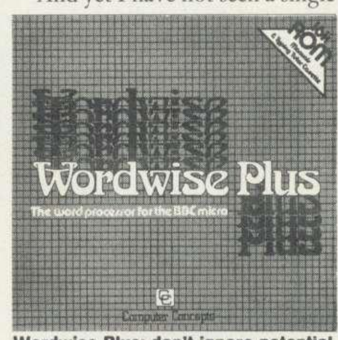
Other contacts include: Michael Nash, 103B College Road, Epsom, Surrey KT17 4HY (cataloguing, accounts, fines with 13,000 entries); Alan Jordan, Mandale Middle School, Bradford BD6 3WW (library database running under Inform database from Nottinghamshire County Council); and finally, Mike Bostock, MEP, Microtechnology Centre, Armstrong House, District 2, Washington NE27 2PR (library system being developed using bar code reader).

ENORMOUS POTENTIAL

Sir, The advent of *Wordwise Plus* as an improvement on the best-selling bit of firmware for the Beeb was obviously an extremely important event, and yet the most notable new feature of it has been totally ignored – that of contiguous files, ie, using disc space as virtual memory, the system used by *WordStar*.

This solves by far and away the most pressing problem with the original program, that of limiting document size to 27k. When we saw the ads promising continuous file programs on disc it looked like our prayers had been answered. Compared to this, the other extra features are little more than frills.

And yet I have not seen a single review which more than mentions its existence. So come on, let's hear about the real capabilities of this excellent firmware.



Wordwise Plus: don't ignore potential

It would be especially interesting to see a review of the extra software coupled with one of the solid-state RAM discs available, such as that made by Opus.

The potential is enormous, too much to be ignored.

Joe Faith
Oxford

READERS' REVIEWS?

Sir, Why don't you have us readers writing in with software reviews? I don't think there are enough in your otherwise excellent magazine.

I know that if I want to read software reviews I should buy a software magazine, but as you don't get as much good reading material in other magazines, I'll stick to *Acorn User*. I bet that anyone with a micro possesses a game of some description and is dying to tell everyone about it.

Something else I think would be as asset to the magazine is if readers also sent in hints and tips on playing games.

Robert Stirling
Galashiels

Yes, to all points. Most of our reviewers and writers started off by just writing something and sending it in. Why not have a go yourself?

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- FX80 tractor attachment £37
- SEIKOSHA GP50A & GP50S £69
- Centronics Printer Cable to interface all the above Printers to BBC £6

(Securicor carriage charge on printers £7)

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Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	£25	RS232 + 2K Buffer	£55
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Single, double and quadruple density graphics modes as well as four character widths and super/sub script printing are also supported, along with many other facilities normally found on printers costing twice as much.

Although the GLP is a very compact printer, it can handle paper up to 10 inches wide. Friction feed is supplied as standard with a low cost tractor feed available as an optional extra.

The GLP is a bidirectional logic seeking printer with a 9 needle print head and features a long life ribbon cartridge. The GLP is supplied with a Centronics parallel interface and comes complete with a ready fitted NLQ font ROM containing a different and more pleasing type face (other font ROMs available, including Gothic, Courier, Italic, Copper Plate, Script, Double, Bold etc.)

Now available in Serial/Parallel or IBM compatible. Please specify.

Send an SAE for further details of the GLP NLQ Designer and extra font ROMs.

Special Offer ***£107*** *(carr £5)*
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Brother HR15 is a high-quality daisy-wheel ideal for a budget printer for serious use. Notable features of this printer include a 3k buffer, 18cps (max), bi-directional proportional spacing, Centronics interface standard, (RS232 optional), optional Sheet Feeder and Keyboard.

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Ribbon Cartridges:
Fabric **£3**; Carbon **£3**; Multistrike **£6**
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**We are now offering at no extra cost ON-SITE 12 months maintenance on all HR15 Printers purchased from us.
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NLQ Mode and current typeface selection from font panel.

Price: **£215** (carr £6)
Tractor Feed Attachment **£20**
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- BM7522 Hi-Res Amber **£77**

FIDELITY COLOUR MONITOR

- Medium Resolution, attractively finished, 14" RGB and Composite VIDEO/AUDIO Input. Has a detachable anti-glare screen.

£169

ZENITH

"Test Bureau Recommended for use in Education"

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read.

Green (New Design) Hi-res **£72**
Amber (New Design) Hi-res **£76**

LEADS

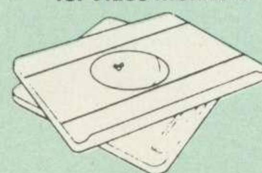
BNC Lead for Zenith or Philips £3
RGB lead for KAGA **£3**

N.B. Carriage on Monitors **£7** (securicor)

CREDIT CARD Orders (ACCESS or VISA) Simply phone (0923) 33383/50234 24 Hour Service

SWIVEL BASES

for Video Monitors



Adjust your Monitor/VDU, Up, Down, Right or Left to provide utmost in operator flexibility & Viewing comfort. It improves your sight lines & reduces stress & eye, neck and back strain. Available in 2 sizes:

for 12" Monitors **£14**
for 14" Monitors **£16**
(carr. £2.50)

4 COLOUR PLOTTER PRINTER

SAKATA SCP-800 printer/plotter facilitates plotting & printing in 4 colours on paper upto A4 size, using easily replaced pens. In text mode it prints upto 12 CPS. Max 160 Char. per line. In graphics mode it offers full plotting facilities incl. drawing, moving, scaling of text, rotation & drawing of axes. (Write for a sample printout).

Only £149

Set of 4 SPARE PENS only **£4.50**

SPECIAL OFFER

HITACHI EPROMs for Sideways ROMs

2764-250nS £2
27128-250nS £2.75

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £3.75
2 × 6264LP (16K) £7.25

PRINTER SHARERS

Connects	
3 BBC Micros to 1 Printer	**£65**
6 BBC Micros to 1 Printer	**£129**

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in for a demonstration.

EXAMPLE PACKAGE
BBC B Plus (64K) Micro; Wordwise ROM; Twin 800K Double sided Mitsubishi Disc Drives; Hi-Res Green Monitor; Brother HR15 professional quality Daisywheel printer; Discdata (database) & Beebcalc (spreadsheet analysis) software packs; Pack of 10 Diskettes; 4 way mains trailing socket; manuals and all leads.

NEW LOW PRICE

Only £999

THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED

This book describes in plain, easy to understand English how to use your printer (Kaga KP810, Canon PW1080A, or any other Epson FX-80 compatible printer) with the BBC micro, both from Basic and your Wordwise wordprocessor.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

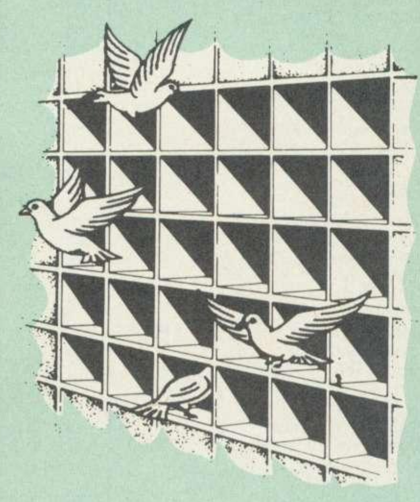
This book is superb value at only
£5.95 (Book – No VAT)



This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette or disc.

Only **£23**

DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

On disc at **Only £17**

(Please specify 40 or 80 track when ordering)
(Please write in for technical specifications)

FILE-PLUS

File-Plus is a powerful database for the BBC micro with many advanced features. Largely menu driven, File-Plus is provided on a 16k ROM with some extra utilities on disc. Features included are detailed below:

- Flexible full screen form layout.
- Built in File Query Language (FQL).
- Printer Output.
- Arithmetic operations in FQL.
- Looping in FQL.
- Number range of +– 9999999999.9999.
- File linking allows files over different drives.
- Multiple forms allow selection of displayed data.

Only £32

(Please specify 40T or 80T disc

DATAGEM

Gemini's 24K ROM based DATABASE Management System

Special Offer: **£67**



The ULTIMATE DFSs for the BBC MICRO

WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)
To celebrate the occasion, we are offering Watford's complete Disc Interface Kit at only £56 and the Double Density Unit at £58.

Just compare the features:

Features	Acorn 1.20	Watford Single Density	Watford Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20 partial	1.43 Yes	1.53 Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for three years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).

PRICES

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£59**
- *Acorn's DFS Kit complete* **£59**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
  (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£16** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these!

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£58**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

Watford Electronics DDFS PLUS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today.

Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.

Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the BBC+, this superb addition to any BBC+ greatly enhances it's performance with a simple fitting operation.

DDFS PLUS incorporates all the features of the Watford's popular DFS & DDFS for the BBC B, (at the same time retaining full compatibility with Acorn DFSs), plus it has the following extra features:

Automatic density selection – Full single and double density operations – Extremely powerful and comprehensive OSWORD &7F emulation – Any file can be full size of disc – Density of last access assumed for speed – Automatic 40/80 stepping swapped on error – All Acorn's extra disc commands implemented.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.

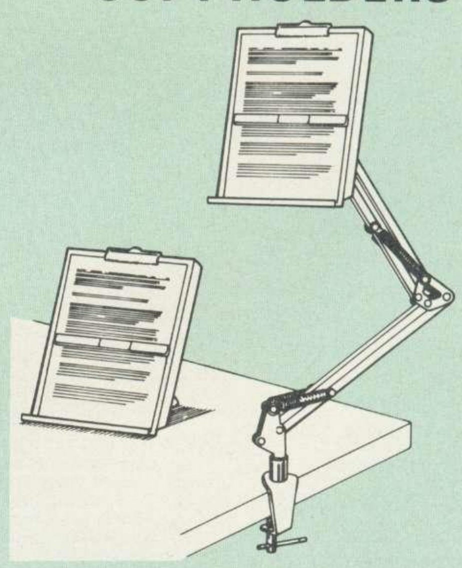
Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.

The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £30 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!

Join the leaders in BBC peripherals; join Watford Electronics – committed to supporting the BBC micro.

DDFS PLUS **£30**
(Price includes comprehensive manual)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only
Desk Top **£9** (carr. £2)
Angle poise **£13** *(carr. £3)*

Quality Disc Drives from Watford Electronics

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them. Users of Acorn's DFS will find that they need to pay the extra for switchable drives if they wish to use 40 track discs in an 80 track drive.

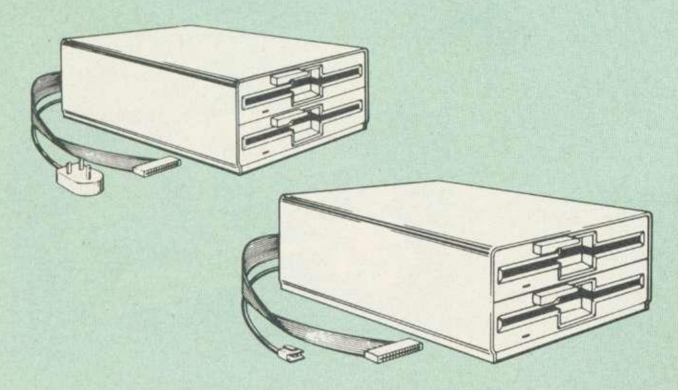
All our Drives are double sided. They are fast (3ms track to track, 15ms settle), quiet and have a low power consumption (average well under 1 amp). Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro. Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

Names you can trust, at prices you can afford!

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

All disc drives advertised here will operate in double density mode with the appropriate interface and software.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS100 £76		CS100 £89	
200K (360K)	CLS 200 £76	CLD200 £140	CS 200 £89	CD200 £145
400K (720K)	CLS 400 £80 / CLS400S £83	CLD 400 £140	CS 400 £100 / CS 400S £103	CD400 £145
800K (1.44M)		CLD800 £162 / CLD 800S £165		CD 800 £179 / CD 800S £186

● TWIN Disc Drive Case, complete with Power Supply & Cables **£35**
Securicor carriage on Disc Drives £5

Prefix C = *Cased Drive*
L = *Less PSU*
S = *Single*
D = *Double*

Suffix S = *40/80 Switchable*

e.g. CLS400S = *Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).*

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£12**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£15**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£22**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£22**

- *10 × 3½" S/S D/D 40/80 track Discs* **£25**
- *10 × 3½" D/D D/D 40/80 track Discs* **£35**

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 ×* **M4** *S-S D/D 40 Track Discs* **£11**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£14**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£19**

- *3" Double Sided Discs* **£5** *each*

DISC ALBUMS

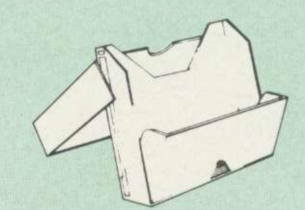
Attractively finished in Antique Brown, leather look vinyl. Stores upto 20 Discs. Each Disc can be seen through the clear view pockets. **£4**

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



M35 - holds upto 40 discs **£9**
M85 – holds upto 95 discs **£12**



PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£1.80**

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. **£8**

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
Single (with PSU) **£3.95** Twin (with PSU) **£3.90**

Continued →



Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

THE NLQ DESIGNER

KAGA KP819/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted.

A 40/80 track format disc containing 3 example fonts is included in the package.

(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

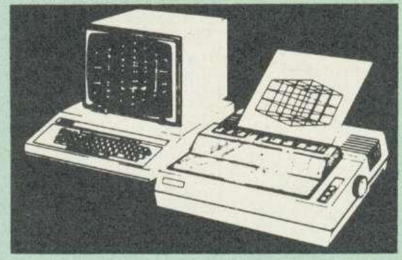
- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

Now available:

- Centronics GLP Printer NLQ Designer ROM **£20**
- GLP Individual FONT ROMs **£14**

(Write in for further details on both).

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is why Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

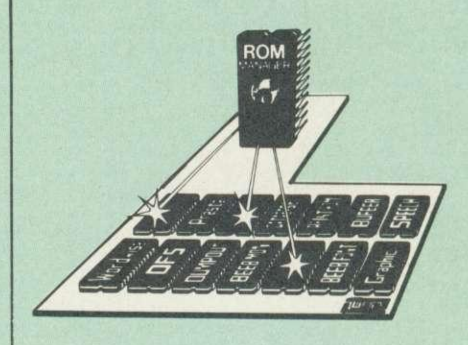
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £24 it must represent excellent value for money and surely cannot be beaten"

Designed for use with the following printers:

CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER



Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

Price **SPECIAL OFFER £18**

BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software. It allows you to display text on the screen in 13 different styles. It is supplied complete with a Spooler and Editor on 40 or 80 track disc.
(Please write in for technical details).

ONLY **£25**

BEEB PRINTER ROM



This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.

★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.

★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.

★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.

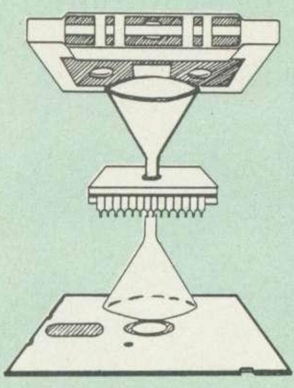
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.

★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

TRANSFEROM

(Tape to Disc Utility)



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

After months of top secret development, we are now able to supply details of this advanced and sophisticated utility ROM for the BBC micro. Just look at the features:

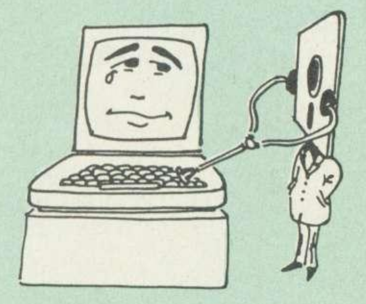
- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

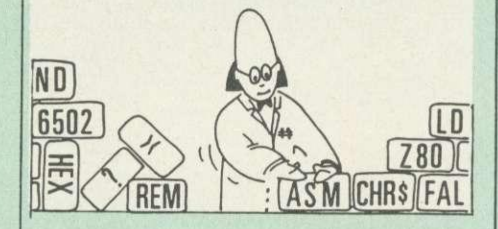
Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!



ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£43**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

ROM-SPELL

"way ahead of any competition"



ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary"

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Don't settle for less. Buy the best.

ROM-SPELL costs only **£25**

(Please state 40 or 80 track disc)

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10** (40 or 80 track)

BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.
Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.
(Write in for technical details.)

£24

DISASSEMBLER ROM

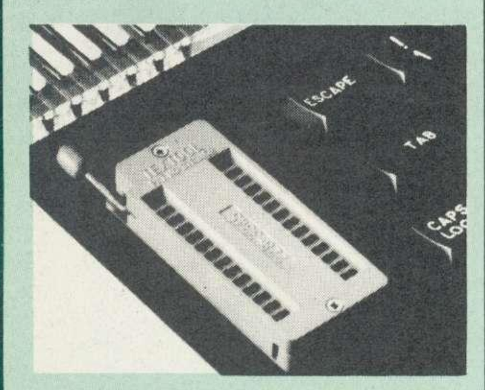
Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.
Please write in for technical details.

ONLY **£16**

Continued



SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£15**

16K Sideways RAM Modules

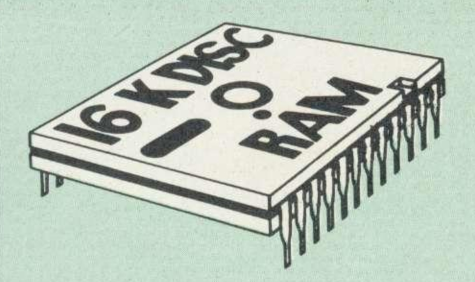
This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Supplied with utilities software disc.

Introductory offer: **£29**

Optional extras

READ and WRITE protect Switches **£2**
BATTERY BACKUP £3



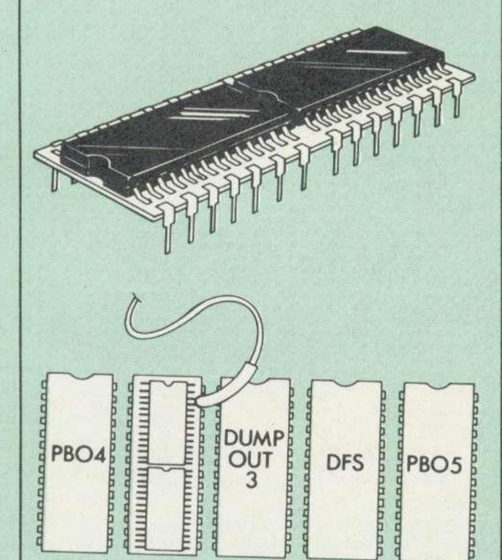
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

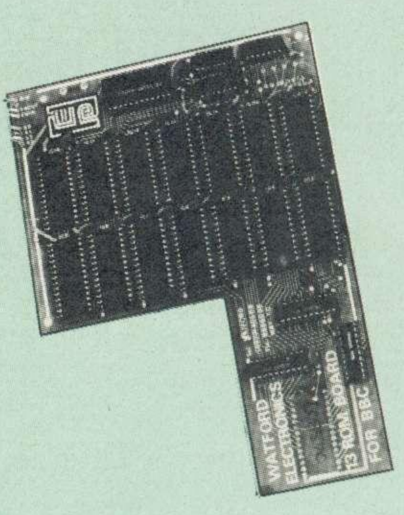
SOLID STATE 16K SIDEWAYS RAM



This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead to fit, this compact unit works with any BBC Micro with or without a ROM board. Compatible with BBC B Plus. Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28**
Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

Mk-3 13 ROM SOCKET EXPANSION BOARD



- Increase BBCs capacity for ROMs from 4 to 16.
- Easy installation; simply plug in with only 5 wires to solder.
- Minimal space needed.
- Compatible with our DDFS, RAM Card, Torch card, 2nd Processors, etc.
- Advanced low power chips keeps power consumption to a minimum.
- Very versatile Socket 14 can take 2716, 2732, 2764, 27128, 6116 and 6264 chips.
- *LOADs or writes in the region &8000 to &BFFF are automatically directed at the RAM.
- Auto-write protect line makes RAM look like ROM.
- READ protect line which makes socket 14 "vanish" – useful to get out of software crashes.
- On-board battery back-up option with a high speed charging circuit.
- Supplied ready-built and tested, complete with fitting instructions.

Price: Still Only £30
Ni-cad 'PCB' Battery £3

SOLDERLESS SIDEWAYS ROM SOCKET BOARD

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Auto write protect for RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£35**

Watford ROM/RAM CARD

A must for all serious users

Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with ALL BBC micros (not BBC Plus).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Write protect for ALL RAM.
- Master write protect for all sockets.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Can run ANY BBC ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

• *ROM/RAM card with 32k dynamic RAM*	*£45*
• *ROM/RAM card with 64k dynamic RAM*	*£69*
• *ROM/RAM card with a massive 128k dynamic RAM*	*£109*

OPTIONAL EXTRAS:

• *16k plug-in Static RAM kit*	*£9*
• *Battery backup*	*£2*
• *Read and Write protect switches*	*£2*
Complete ROM/RAM board (all options installed)	*£125*

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimensions to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£51** (£3 carr)

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *BT Approval applied for.*

Price: **£89** (carr £3)

(Price includes Software ROM, Cables and Manual)

Nightingale Modem

SPECIAL PRICE to our Customers

£119

(Price includes COMMSTAR ROM & comprehensive manuals)

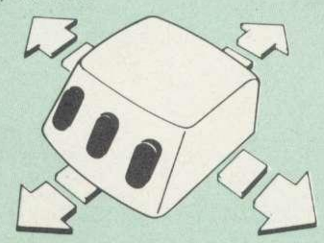
Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

GIFT VOUCHERS

Following numerous requests from you the customers, we have at last introduced our GIFT VOUCHER service. The Vouchers are available in £5; £10 & £20 denominations and are an ideal answer when faced with that problem of what to give for that special Birthday/Christmasgift. Simply send your credit card number or your cheque for the amount of Vouchers you require and we shall send you these attractive Vouchers. (There is a 50p handling charge on any amount.)

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £66.95

We are giving away the sophisticated **COLOUR ART** Software package **ABSOLUTELY FREE** with every purchase of the AMX Mouse from us.

AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.50**
AMX SUPERART Package	**£43**
AMX PAGE-MAKER Pack	**£43**
AMX 3D ZICON Disc	**£21**
AMX Database Disc	**£21**
AMX XAM Educational	**£21**

COLOUR ART

This novel program allows you to add COLOUR to any drawing produced with your AMX Mouse package, and really brings those pictures alive. Not with just any colours, mind you, but a full range from up to 255 different shades! It's simplicity itself to use this "painting by numbers" painter to create simple, striking and powerful images to please the eye.

Price **£10**

(please specify 40 or 80 track disc when ordering)



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32

LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: £55

Continued 

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£52
CARETAKER Basic Utility	£27
Graphics ROM	£26
Disc Doctor ROM	£26
TERMI	£27
COMMUNICATOR	£58
SPEECH ROM	£26

Wordwise

The most popular Wordprocessor for the BBC Micro.

Special Offer: **£32**

Wordwise plus

£45

FREE FREE FREE

This month we are giving away absolutely FREE, the superb Word-Aid ROM worth £20, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.

Only **£20**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET

The most powerful spreadsheet package available for the BBC Micro. Ultra-fast replication and calculation times help make this the easiest to use. It has received very favourable reviews. Unique 105 column screen mode. Supplied in 2 ROMs.

£45

INTER CHART

This unique program is the only one of its sort on the market. Accepts data from a variety of sources and plots line graphs, bar charts or pie charts. Up to 16 separate charts may be stored in memory. Built in screen dump for EPSON compatible printers, but can use other printer dump routines.

ONLY: £30

These ROMs form part of the first and only truly integrated range of programs for the BBC. Up to 16 sets of data can be stored in memory at once and data can be transferred directly and simply between programs, e.g. from sheet to sheet, or sheet to chart, or word processor to sheet etc., etc.

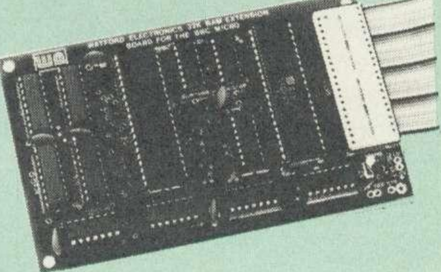
INTER-WORD and INTER-BASE will follow shortly to complete this suite of programs.

P.S. The Watford 32k shadow RAM board is an ideal complement to these programs, allowing them to operate in the 80 column screen modes with NO reduction in memory.

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in text in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Only 12K Buffer can be used in Wordwise or Wordwise+ because of the way these softwares are written. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Only 12K Buffer can be used in Wordwise or Wordwise + because of the way these softwares are written.
- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Only: £59

(Price includes a comprehensive manual and the ROM)

VIEW

VIEW WORDPROCESSOR 2.1 .... **£46**

VIEW 3.0 ROM

This latest version features automatic relocation with a 6502 second processor and takes full advantage of any shadow memory fitted. BBC B Plus compatible. Supplied complete with Printer Driver Generator tape.

Price: Only **£60**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft)	**£49**
VIEWSTORE	**£49**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £10

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, for a limited period only, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K RAM Card (offering printer buffering and shadow screen RAM facilities) with the well known WORDWISE PLUS Word processor.

The Watford 32K RAM Card was the first 32K shadow RAM expansion card for the BBC micro and offers some genuinely useful facilities to the word processing prodigy.

32K Shadow RAM Card/Printer Buffer and Wordwise Plus (a very powerful package) for the absolutely astounding price of:

Only £69

(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)

ISLAND LOGIC MUSIC SYSTEM

£25

Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

£42

BOOKS (No VAT on Books)

21 Games for the BBC Micro	£5.95
30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
40 Educational Games for the BBC Micro	£5.95
6502 Assembly Language Program	£13.95
6502 Application	£11.95
6502 Assembly Language Subroutines	£19.95
6502 Machine code for Humans	£7.95
68000 Assembly Lang. Programming	£19
A you— persons guide to BBC Basic	£4.50
Advanced Disc User Guide	£9.95
Advanced ROM User Guide	£14.95
Advanced Machine Code Technique for BBC	£7:95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Advanced 6502 Programming	£12.45
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
Applied Assembly Lang. for BBC	£7.95
Assembler Routines for the 6502	£**XXX**
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Programming made Easy	£5.95
Basic ROM User Guide	£9.95
Basic User Guide for BBC Micro	£10.00
BBC BASIC for Beginners	£7.95
BBC BASIC	£5.95
BBC Forth	£7.50
BBC Hardware Projects	£8.95
BBC Machine Code Portfolio	£7.95
BBC Micro 'I on guide	£5.95
BBC Micro A, :pert Guide	£6.95
BBC Micro Assembly Language	£7.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Graphics and Sound	£6.95
BBC Micro ROM Book	£9.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Disc Companion	£7.95
BBC User Guide	£10.00
BBC Wargaming	£8.95
Basic Programming on BBC Micro	£5.95
BCPL User Guide	£15
Brain teasers for BBC micro	£5.95
Business Applications on BBC	£7.95
Computing for All the Family	£6.45
CP/M Bible	£16.00
CP/M Handbook with MPM	£13.95
CP/M Soul of	£14.95
CP/M The software BUS	£8.95
Creating Adventure Programs on the BBC Micro	£4.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£7.95
Discovering BBC Micro Machine Code	£6.95
Discover FORTH	£13.95
Easy Programming for the BBC Micro	£5.95
Electron Machine Code for Beginners	£6.95
Exploiting BBC Basic	£6.95
Exploring FORTH	£6.95
Filing System & Databases for the BBC Micro	£7.95
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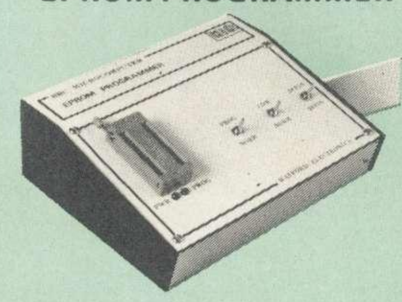
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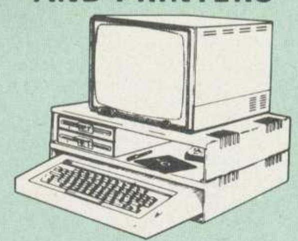
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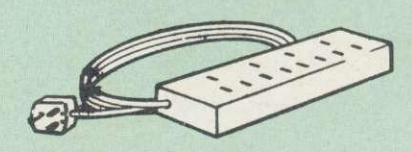
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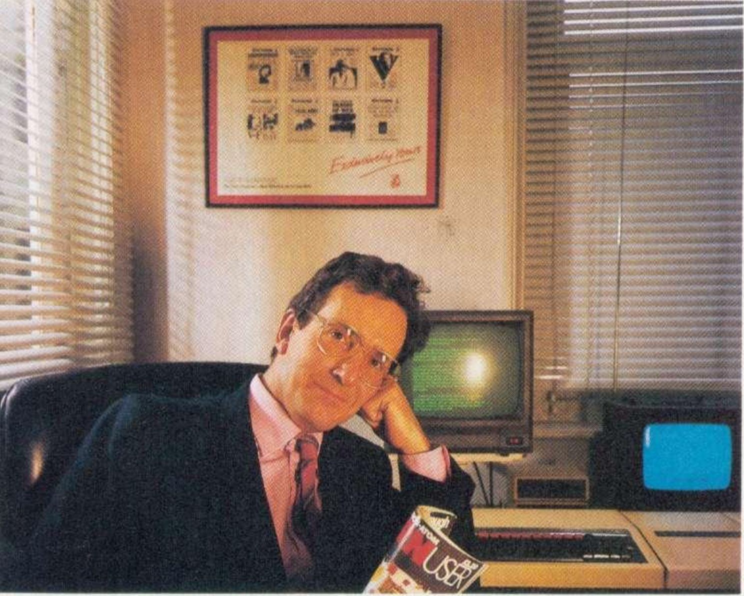
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ME & MY MICRO

New series on the famous and their micros

Christopher Ward



Three years ago, I didn't have a computer, didn't need a computer and didn't want a computer. Today, I own three Beebs and am about to acquire a fourth. I'm almost ashamed to admit it, but I couldn't live without them.

For most people, getting started is a difficult experience; for me, it was sheer agony. In 1983, when I took that first bold technological step and bought a BBC micro, all Acorn's instruction books were written by wireheads for wireheads. The manuals have improved a lot since then, but there is still an assumption that people are born knowing what a !BOOT file is.

It took me three weeks to discover there wasn't a *View* wordprocessing ROM in my machine; a month to learn that discs had to be formatted before you could use them; and longer still to discover why all the software I bought produced disc-fault readings – I had an 80-track drive and the discs were all 40-track.

Nothing in my life has caused me more frustration and rage than that first month with my Beeb; but I persevered with the manuals and, eventually, I cracked it.

I use my Beebs almost exclusively for wordprocessing. Of all the systems I have tried *View* is the simplest, the easiest to learn, the one that's most like putting a sheet of paper into a typewriter. To a journalist like me, it's a great boon to be able to edit copy without having to retype the whole article every time, and to set up the headers and footers so that each page is numbered and my name is at the top of every sheet. Not having to count the words any more is a real luxury, too.

The first thing I did was type in my contacts book, which has about 1000 names, addresses and telephone numbers. Updating it on a typewriter used to be a mammoth task for my secretary – now it's a half-hour job to produce clean, accurate updates.

Within a very short time, I was fighting with my children for the use of the micro at home, so I bought them their own. This uncharacteristic act of paternal generosity rather backfired, for my 12-year-old daughter monopolised the new machine while my nine-year-old continued to use mine. We now have an understanding that I don't use theirs and they don't use their father's.

Before the B+ was introduced, the biggest shortcoming of the Beeb was the lack of memory – 9000 bytes hardly fills a jamjar label. So I bought a 6502 second processor which gives me almost 50,000 bytes with the latest version of *View*, more than I ever need for a single file.

The second add-on I acquired was the Prestel adaptor. I use Prestel a lot for business – to track share prices on Citiservice, for instance – as well as to retrieve more mundane information such as train times. I opened home-banking accounts for all the family with the Bank of Scotland six months ago, and pay the children their pocket money every Saturday morning on the Beeb. I'm hoping that seeing the interest their money earns each week will encourage them to manage their affairs more sensibly than I have ever done.

When Redwood Publishing was established two years ago, we decided that everyone on the staff would use BBC micros exclusively. The company now employs 62 people and every member of staff has a Beeb linked by an Econet to a Winchester file server.

It has proved to be a cheap and reliable system and, just as important, new staff or freelance journalists with no experience of wordprocessors or computers can get the hang of the thing in a couple of days with a little help from the rest of us.

We use Telecom Gold a lot at Redwood, and I'm its greatest fan – it's marvellous being able to send in copy from home or read articles and documents without racing into the office or biking them across London.

A lot of our contributors, including Ann Leslie of the *Daily Mail* and Simon Winchester of the *Sunday Times*, file all their copy on Gold.

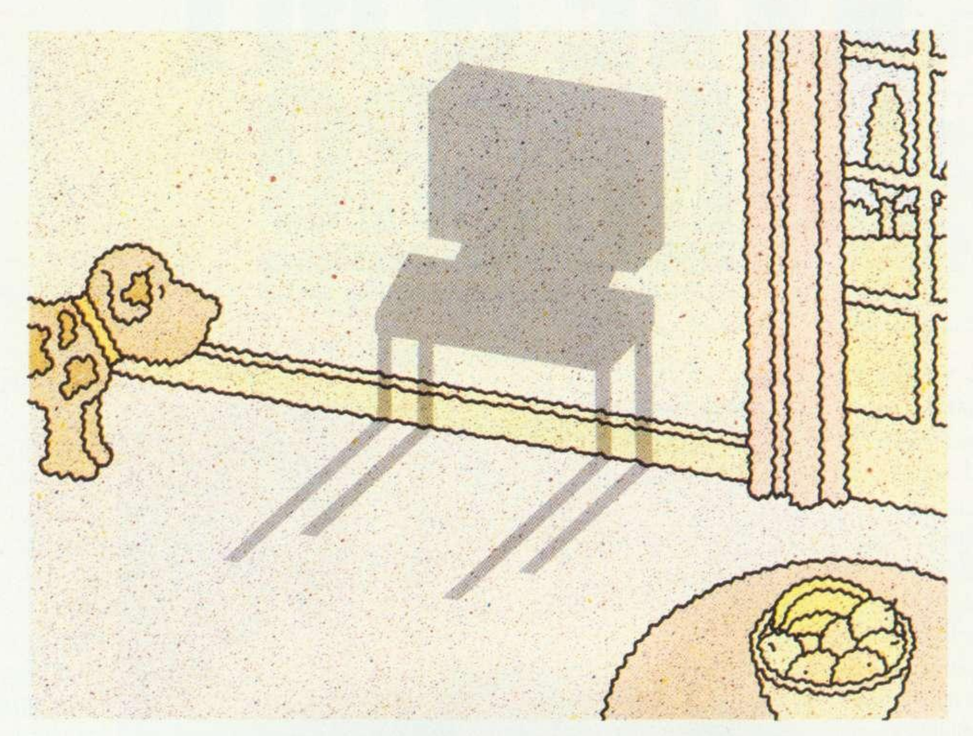
Thanks to some software developed by a friend at Acorn, I'm able to log on to Gold with a single keystroke of my Beeb and upload files straight down the line. Everyone should have a friend at Acorn!

I now have a B+ in the office, but I have already run out of ROM socket spaces. I use *Viewsheet* for spreadsheet calculations at home and at work, and I'm just grappling with *Viewstore* – which I think is the best thing since sliced bread. With some help from our resident wirehead, I'm feeding into it my address book from *View* which will give me half-a-dozen mailing lists.

After two-and-a-half years, I'm still discovering short cuts which have been learned the hard way (for instance, I only discovered this week how to program the function keys to switch drives and load frequently-used files). I'd be happy to pass these on to *Acorn User* readers in a separate article some time, if only to hear the wireheads shout: 'But everyone knows that. Don't they?'

Christopher Ward is Editorial Director of Redwood Publishing which publishes Acorn User, *and a non-executive director of Acorn Computers. He is a former Editor of the* Daily Express.

PHOTOGRAPH BY DAVID GAMBLE



INTO THE SHADOWS

Look no further for ideas on how to use the extra memory and facilities of your new B+ or B+128

Joe Telford

In the spring an *Acorn User's* fancy turns to possible upgrades. When this article was penned (early November) the current state of the Acorn was the B+ in various guises. Whatever the future might bring in terms of new machines, hopefully the Acorn adage of compatibility will be maintained. This means that memory management on the B+ might be regarded as a useful skill to acquire, and will have applications into the future.

There are two types of memory on a standard BBC micro. A bank of 32k RAM which contains the computer's workspace, the user's workspace, and the graphics memory, along with two 16k banks of ROM, containing the operating system (OS) and the current application language or service. Users will already be aware that the application bank can be switched between 16 different physical chips (four on board the BBC micro and a further 12 via extension boards).

The B+ takes a tip from several peripheral manufacturers, by including more easily accessible onboard ROM, using sockets which can handle 16k or 32k ROM chips. But more importantly, the B+ has an extra 32k of memory. This is shown diagramatically on page 77. You'll see that it lies in the 'shadow' of the main memory, and indeed it is this concept of extending memory like a shadow which gives it the name shadow RAM.

One great drawback of the BBC microcomputer was the trade-off between user memory space for programs and graphic screens. The microprocessing unit (MPU) in the BBC B and B+ micros cannot easily access more than 64k of memory, hence the need for clever tricks like paging ROMs.

If we apply the idea of paging to RAM, then RAM can be vastly extended.

There is, however, a problem which boils down to ease and friendliness of use. Users with 128k BBC B+ micros will be aware of the hassle of running the disc Basic system. Using paged memory without well thought out applications software amounts to a waste of money. Fortunately the 128k B+ at least has Basic and a number of other useful facilities with which to drive its extended paged memory. Although, in my opinion, such paging is not to be preferred over direct access memory, it can prove useful when memory space is at a premium. In order to maintain compatibility, in the short term at least, shadow memory is the sensible approach to take. The basic shadow memory is in two parts: first an extension (20k in extent) which shadows the area of memory given over to graphics, secondly a further 12k of shadow RAM up in the area devoted to paged ROMs.

The easiest part of shadow RAM to come to terms with is the graphics area. This has a new OS command associated with it: *SHADOW.

ILLUSTRATION BY JIM MAWTUS

DIAGRAMS BY KEVIN JONES

*SHADOW turns on the shadow RAM and *SHADOW 1 turns it off. While the shadow RAM is active, users have access to all the workspace from PAGE to &8000. For compatibility with older BBC micros, the shadow RAM is initially off at power on. This reduces problems with older versions of software.

(We really cannot expect to benefit from shadow memory if our software does not use approved methods of reading and writing the screen. For example, PRINT"HELLO CHEEKY" is legal, but ?&7FFF=255 is not. In shadow mode, it will not have the desired effect, doing nothing at best, but at worst corrupting user memory space. Cure: (1) rewrite your software, or (2) get the software house to provide legal versions or (3) don't use shadow memory.)

The B+ operating system provides us with other ways of accessing the shadow RAM areas, and the rest of this article is aimed at demonstrating those techniques. So that users of older BBC micros don't feel left out, most of our demonstrations will work on model Bs, even though the shadow memory does not exist. Even without the added incentive of shadow memory, some of the techniques will merit further exploration by users.

What's in a ROM?

We start by noting an operating system routine undocumented by Acorn, which exists on the BBC model B. The same OS routine is documented on the B+ and is called OSRDSC – Operating System ReaD SCreen. In the *Advanced User Guide* (Bray, Dickens and Holmes) this routine is called OSRDRM – Operating System ReaD RoM.

OSRDSC lives at &FFB9 and its job is to read a byte from paged ROM or RAM. We use this routine regularly, and so we begin with a simple example.

Listing 1 runs on any BBC micro, but not via the Tube. It is intended to provide a software means for checking that a particular ROM chip is in the computer, rather than error trapping its non-appearance. This is particularly useful as an addition to Econet menus, which autoboot a user into a language or other chip based application.

The name of the ROM to find is specified in line 60 of listing 1, and line 70 calls the FNchip function. This returns a TRUE or FALSE answer and appropriate action can be taken upon its receipt.

In checking for the ROM in question, the function cycles through all 16 possible ROMs, starting at 15 and working down to 0. For each ROM, the ROM number is transferred to the Y register via Y% in line 180. The next stage is to set a pointer to the start of the name string in the ROM. This always starts at &8009, so ?&F7 is set to &80, and ?&F6 to &08, which is one less than the start address, because the program uses a REPEAT loop to increment ?&F6. OSRDSC (OSRDRM) automatically uses locations &F7 and &F6, so we have no choice here.

The diagram below indicates the relationship between the Y register (Y%), &F7, &F6 and the paged ROM system.

Once OSRDSC is called using the USR function of line 200, the byte at location &8009 is read into the accumulator and transferred to the variable 'char'. This is used to build a string in line 210, which becomes the name of the current ROM. Line 220 repeats the cycle and initiates reading the next byte. This continues until the character read is a 0 or until the ROM title string is as long as the name being sought. Line 230 is included only for demonstration, and should be removed once the program is operational. It lists all the ROMs in the machine. Line 240 checks whether the current ROM name is correct and if so, exits. Otherwise the socket number is decremented and the cycle restarts with the next lowest socket. If a match is found the function outputs TRUE, otherwise it returns FALSE.

Packing a disc

Now for a problem. How many screens to the disc? Too hard? OK then, let's simplify. If a BBC micro screen takes up 20k maximum, and a disc holds 100k, this means that we can fit five screen dumps to a disc. With a 200k drive this goes up to 10. If you work with graphics, then you might build up a library of screen dumps, and consequently amass a pile of discs. One way round this is to pack the information on to the disc in a coded form, and the simplest way is to use the following algorithm:

1 OPEN OUT a file called PICT
2 point to the start of screen
3 REPEAT
4 read a pattern byte from the screen
5 REPEAT
6 read another
7 UNTIL a different value is reached or 255 bytes have been read
8 PUT the pattern byte and the number of matching bytes to the disc file
9 UNTIL the end of the screen is reached
10 CLOSE the file and END

This algorithm is shown coded in listing 2 which works on older BBC micros, and on the B+ in *non* shadow modes, but not via the Tube or in shadow modes.

Once a disc is packed with screen information, you have the problem of unpacking, or

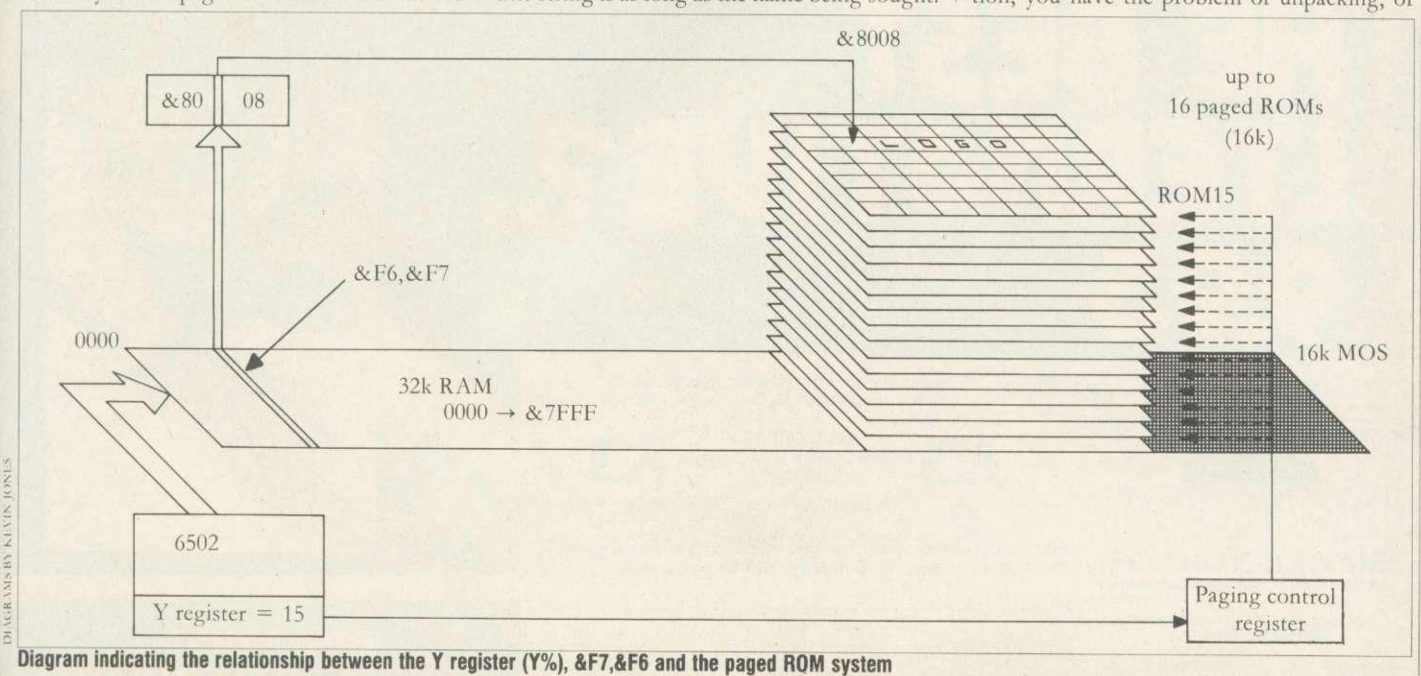
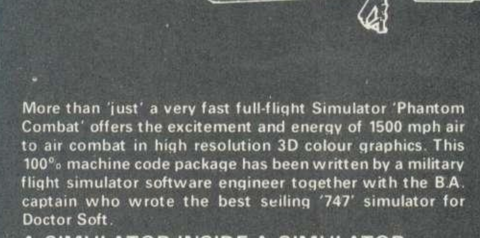


Diagram indicating the relationship between the Y register (Y%), &F7,&F6 and the paged ROM system

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reversing the PACK procedure. The algorithm might be written:

1 OPEN IN a file called PICT
2 point to start of screen
3 REPEAT
4 GET the pattern byte and number of bytes
5 REPEAT
6 place the pattern byte on the screen
7 UNTIL the correct number have been placed
8 UNTIL the End Of File is reached
9 CLOSE the file and end

The coding for this is shown in listing 3. Again this works fine with BBC micros but not via the Tube or on a B+ in shadow mode.

The benefit of packing and unpacking is a great saving of memory space on disc. Typical 20k screens can often be reduced to 10k or less, occasionally screens compress to 4k. The compression achieved depends on the content of the screen, so for example a screen with large areas of colour will generally compress more than a screen with lots of fine detail. A screen in which each byte pattern is different from the preceding one will actually occupy *more* space on the disc (one byte for the pattern and one for the number of bytes), up to a maximum of 40k. The solution is to both *SAVE screens and PACK them, then delete the one which occupies most space. Remember to place packed screens in a directory 'P'.

The disadvantage of packing is the time factor in using the Basic programs to pack and unpack. Notice, too, that to use the facility effectively the programs would need careful handling or modification to fit in with any particular graphics package.

Speeding out of the shadows

It goes almost without saying that the most convenient interface between languages and applications packages is the operating system and its star commands. If we could convert the pack and unpack routines to star commands, speed would be increased and handling would be much more flexible. So we must consider encoding the programs in machine code.

Although a supporter of high level languages and ease of programming, I grudgingly admit (for now) that assembly language work does have an important role to play either when processing time is of the essence, or when accessing particular features of the machine is impossible with our favourite high level language. In this case we really do need speed, and so we must consider machine code.

If you are not into machine code, don't despair. Read through the next section on developing *PACK and *UNPACK, and concentrate only on the structure of the solution. If you can correctly structure a solution, then the actual assembler commands can be looked up in a suitable book.

You might wonder why we wrote two Basic programs, when we intended to produce machine code end products. The answer is that if the Basic programs work and are correctly structured, then they should be converted to assembler without too much difficulty. In fact, writing a Basic program often makes the problem much less difficult.

In order to solve the problem of producing a *PACK command which will work on the B+ we need to specify what our requirements are. From typing *PACK <filename> we expect to pack a screen in modes 0, 1 or 2 to the currently selected disc drive.

We approach the problem by dividing it into a series of stages:

1 How do I initiate a star command?
2 How can a parameter be added? (eg *PACK P.PICT)
3 How can I openout a file in assembler?
4 How do I handle a file error?
5 How do I convert the Basic PACK program to assembler?
6 How do I cope with shadow memory?
7 How do I transfer bytes to a file in assembler?
8 How do I exit from the program?

Below is a quick outline guide to solving each of these sub-problems. The actual coding is in listing 4, and is well commented. Look at it while reading the outline guide.

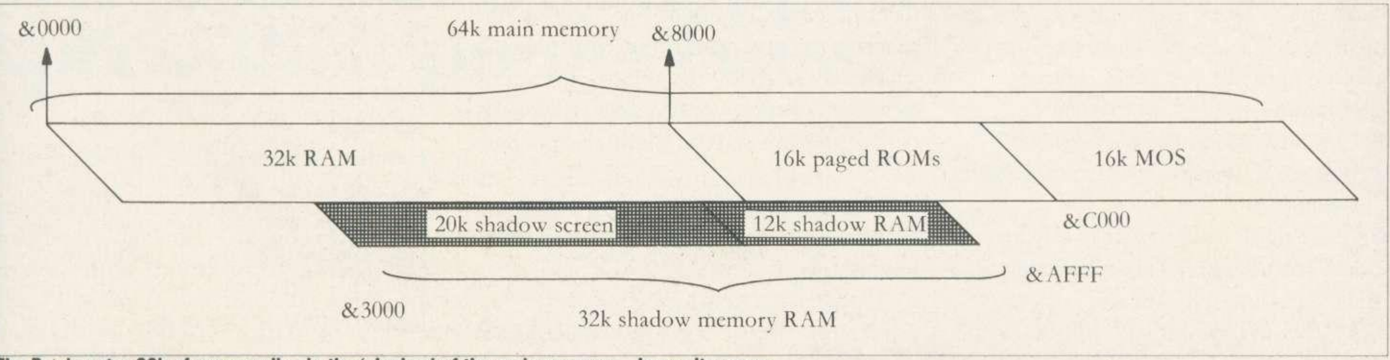
Star commands are either typed at the keyboard, entered as a line of a program or executed as a part of a *EXEC file. In all cases they are handled by the OS. The command is first offered to each of the paged ROMs, and if they do not react to it, it is then offered to the current filing system. This is the solution adopted in all these programs. The *PACK command will cause the machine language version of PACK to load to location &0900, and automatically execute there. Page 9 of BBC micro memory is given over to sound, speech, RS423 or cassette buffers. Providing we are using disc storage, this is a reasonably safe, out-of-the-way area of memory to use for the task. Users with problems might try using page 10 (&0A00: RS423 cassette input) as an alternative. Do this by changing line 60 to START = &0A00.

Decoding a parameter: whenever a star command is received, the OS places the address of the first location after the decoded command in locations &F3 and &F2 + Y register. For example, if *PACK P.PICT is found in a program at location &2300, then ?&F3 and ?&F2 + Y register will jointly point to &2306.

In listing 4 this total address is transmitted to the filing section of the program via lines 160 to 260. Notice that the first stage is to add ?&F2 and the Y register and then add 0 to ?&F3 in case there was a carry-over from the earlier addition.

OPENOUT in assembler is really quite easy. The address of the filename is now in the X and Y registers. All that remains is to set the accumulator to &80 (the code for OPENOUT) and then jump to the OSFIND subroutine at &FFCE. The result is either a successful OPENOUT indicated by a non-zero value being returned in the accumulator, or a failure, which is indicated by the accumulator returning zero. Lines 240 to 290 comprise the OSFIND section of *PACK.

Handling file errors follows the usual BBC convention of embedding the error number and message in the program. Lines 300 to 340 cover this technique. If the accumulator returns zero after the OSFIND, then line 300 is ignored and the program hits the BRK instruction of line 310. This is automatically processed, the 'Can't write Pack file' message is



The B+'s extra 32k of memory lies in the 'shadow' of the main memory – hence its name

printed, and the program halts. If you type PRINT ERR, then the number 51 will be returned, so that error trapping from Basic can be performed. If a non-zero result occurs, then the program branches from line 300 to line 350, and continues.

Converting the Basic PACK program is simply a question of converting the body (lines 70 to 140) of listing 2 to assembly format. This is covered in listing 4 from lines 360 to 770. Notice that the REPEAT structures are lost because of the branching nature of assembly code. The program is well commented and should be easy to follow. However two points of interest are included below.

Coping with screen shadow RAM: if the OSRDSC routine at &FFB9 is called with the Y register set to 0 and the contents of &F6 and &F7 pointing below &8000, then that byte of shadow memory will be transferred to the accumulator. In *PACK's source code this is done by lines 850 to 910.

Transmitting bytes to a file: to perform the same operation as Basic's BPUT, we use the routine called OSBPUT at &FFD4. This routine needs the byte to be transmitted to be loaded into the accumulator, and the number of the file (the handle) to be loaded into the Y register. Calling OSBPUT causes the transfer.

To exit from the program, first the file must be closed, and this is performed by lines 790 to 820. Calling OSFIND with the accumulator set to 0 and the handle in the Y register, closes the file. The return from the program is performed via the RTS at line 830.

To use the program, first enter it into the computer, save the source code and then run it. The machine code will assemble at &0900. Now type:

*SAVE PACK FFFF0900 + 82 FFFF0900

This will save the machine language to disc. Note that the FFFF's preceding the address are used to force the program to load in the I/O processor, even when called across the Tube.

How to unpack

To produce a *UNPACK command which will work on the B+ we need to follow a similar tack. From typing *UNPACK <filename>, we expect to unpack a disc file to a mode 0, 1 or 2 screen. There are fewer new problems to handle now. They reduce to:

1 How can I openin a file in assembler?
2 How do I cope with shadow memory?
3 How do I transfer bytes from a file in assembler?

Below is a quick outline guide to solving each of these sub-problems. The actual coding is in listing 5, and is well REMmed.

OPENIN in assembler: this uses the OSFIND routine at &FFCE. It requires the name of the file to start at the address pointed to by &F7 and &F6 + Y register, and this address has to be copied into the X and Y registers. The accumulator needs an OPENIN code (&40) and the routine returns either the file handle or a 0 indicating an error. Lines 170 to 350 show this coding.

Writing shadow memory: the method is to use a special routine in the OS, OSWRSC, located at FFB3. This requires the byte to be written to be located in the accumulator, and the address of shadow memory for the byte to be indicated by ?&D7 and ?&D6 + the Y register. To make this easier, I set the Y register to 0 and increment ?&D6. This part of the program is shown in lines 550 to 610.

Using BGET in assembler is done using OSBGET, a routine at &FFD7. It needs the handle in the Y register and returns the byte in the accumulator. If end of file is reached, then the carry flag is set and this must be tested. This part of listing 5 is shown between lines 430 and 530.

To use *UNPACK, proceed as with *PACK: save the source code and then RUN the source program. Once run it can be saved to disc:

*SAVE UNPACK FFFF0900 +63 FFFF0900

It can be used as a machine language utility.

SSAVE and SLOAD

One or two folks have commented that a shadow version of *SAVE and *LOAD would be useful for shadow screens, without compacting. Listings 6 and 7 show these utilities. They are well REMmed and should be easily followed. To use them, first SAVE then RUN the source code, and *SAVE the assembled machine code. For *SSAVE:

*SAVE SSAVE FFFF0900 +61 FFFF0900

and for *SLOAD:

*SAVE SLOAD FFFF0900 +55 FFFF0900

These can be used with:

*SSAVE <filename>

and

*SLOAD <filename>

Putting it to the test

It would be unfair to leave you without a standard means of testing the value of the programs given. Listing 8 is a Basic program which calls each of the utilities previously mentioned to pack, unpack, sload and ssave a typical graphics screen, which the program also generates.

With the utilities on disc, run listing 8 and confirm that all goes well. Once the program is finished try

INFO.*

and compare the size of P.TEST and U.TEST. Try manually recreating the picture with:

MODE 1
*UNPACK P.TEST

Readers with B+ micros will be able to try these new techniques out immediately. In many cases readers with BBC Bs will be able to try out the same facilities although they will not be able to use shadow applications, unless they purchase a compatible shadow board.

Jargon Box

RAM: Random Access Memory – volatile part of the computer's memory, its contents can be readily changed by the user and are lost when power is disconnected.

ROM: Read Only Memory – non-volatile part of the computer's memory which is not erased when power is switched off. ROM chips are used for languages such as Basic and the operating system.

Sideways ROM: A ROM chip containing a language or set of useful machine-code programs ('utilities') which occupies one of the sideways sockets located under the keyboard on the BBC B, at the rear of the B+ and as an add-on extra for the Electron.

Sideways ROM image: A copy of the program or language in a sideways ROM saved on disc or tape.

Sideways RAM: A RAM chip or circuit board containing RAM chips which is inserted into a sideways ROM socket and into which ROM images may be loaded from disc or tape.

Language: A program used to write programs! The most commonly used language on the BBC micro is Basic.

Service call: Often the operating system has to 'ask' the ROMs present in the machine to supply information about themselves. A service call is the means by which this is done.

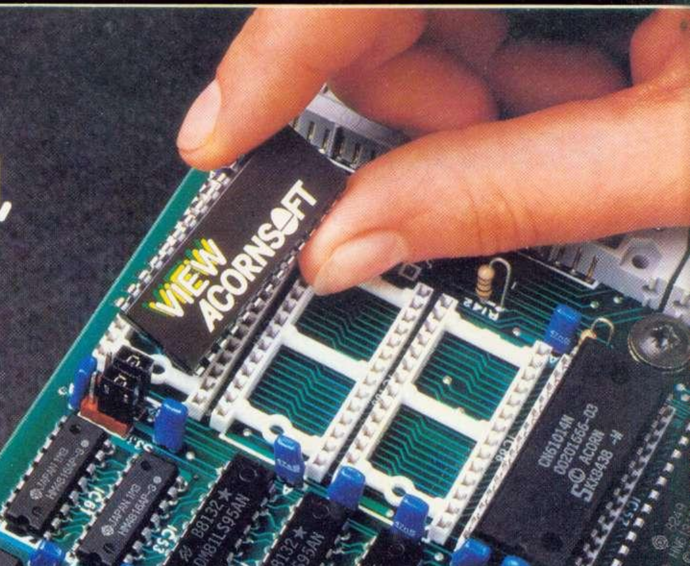
Shadow RAM: Additional RAM, most commonly used to store screen images. Shadow RAM lies 'alongside' the standard RAM of the machine, ie occupies the same memory addresses.

Video RAM: Another term for shadow screen RAM.

Paged ROMs: ROMs on the BBC micro and Electron are all 'paged'. They occupy the same area of memory (ie, &B000 to &BFFF), so in order to use a particular ROM it must be 'switched on' or 'paged' beforehand.

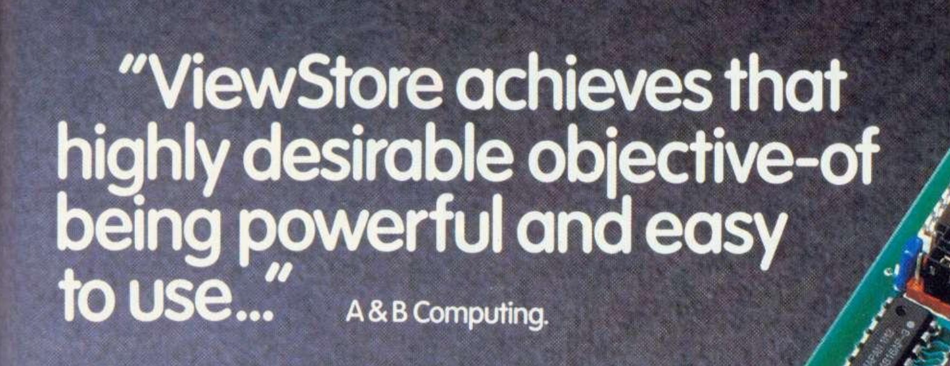
Handle: A number given by the computer to a disc or tape file when it is opened for reading or writing. This number (also known as the 'channel') is used to specify which file is meant whenever data is read from or written to tape or disc.

Joe's listings are on yellow pages 108 to 111



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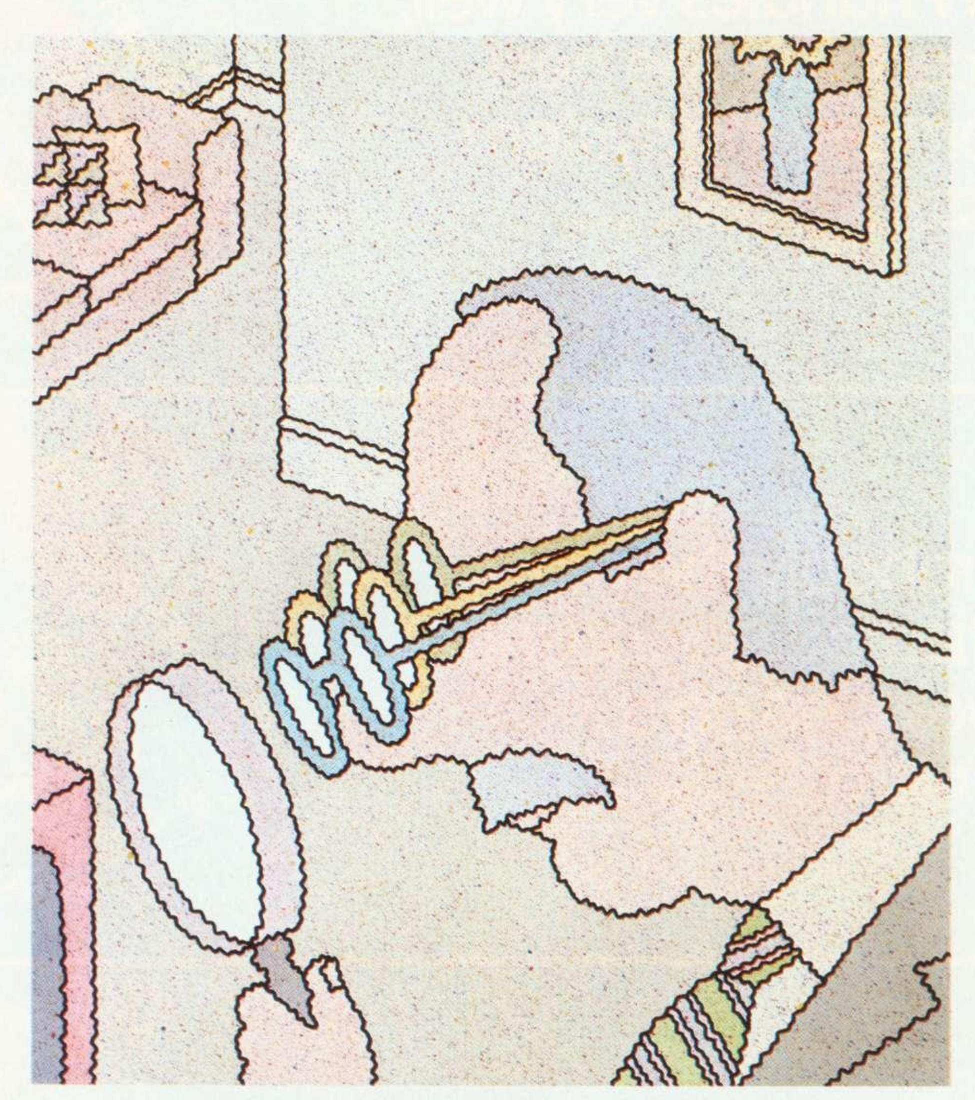


ILLUSTRATION BY JIM MAWTUS

SHRINKING SCREENS

Many recent games – Banjax is just one – have employed the technique of using only a small part of the screen for display, so that there is more memory left for the program or data storage

Robert O'Leary

Have you ever been in the situation where the program you wish to write requires the high resolution graphics of modes 0 or 1, or the multi-colours of mode 2, but also needs more than the 6k to 87k of memory normally available? If so, the following technique may provide the solution – shrinking the part of the screen displayed and using non-displayed screen memory for part of the program or data storage. Similar techniques to this have been used in a number of recent games, including *Banjax*. Unfortunately this technique can only be implemented on the Beeb – it will not work on the Electron.

The part of the BBC micro which allows us to change the screen size is the 6845 CRTC (cathode ray tube controller) chip which, together with the video ULA, forms the system responsible for displaying the picture on your television or monitor. The 6845 contains 18 registers (or store locations) numbered R0 to R17. They are divided into three types: write only (R0 to R13); read/write (R14 and R15); and read only (R16 and R17).

Registers 0 to 15 can be written to in the following three ways:

1 *FX151,0,register
   *FX151,1,value
2 VDU23,0,register, value, 0,0,0,0,0,0
   or VDU23; register,value;0;0;0
3 ?&FE00 = register: ?&FE01 = value

All three methods have been incorporated into the demonstration program (listing 1 on the yellow pages) to illustrate them in use.

In modes 0 to 2 the screen occupies 20k of memory, ranging from &3000 to &7FFF. There are 32 text lines down the screen which means that each line takes up 640 bytes of memory. If, for the sake of argument, it was estimated that a program would require an extra 5k (= 5120 bytes), then 5120/640 = eight lines of the screen would need to be used. This would involve raising the start of screen memory by 5k to &4400 and setting HIMEM (in Basic) to a similar value, thus allowing the program and data to fill the available memory from PAGE to &43FF. The screen would then be 24 lines deep.

6845 registers

The 6845 registers which we can use to reformat the screen are 6, 7, 12 and 13. Register 10 is used to switch off the cursor. R6 is a seven bit, write only register which contains the number of vertical characters currently displayed. It can be used to blank off part of the screen, in our case the part containing the program and data. R7 is also a seven bit register. It determines the start position of the vertical synchronisation and can be used to centralise the new, small screen.

R12 and R13 combine to form a 14 bit, write only register and their contents determine the location in memory of the top left-hand corner of the screen.

Their actual content (in modes 0 to 6) is the screen start address divided by eight. R12 contains the high byte and R13 the low byte.

It is by changing the values stored in these registers that smooth hardware scrolling as used in *Planetoids* and *Castle Quest* can be achieved. We use them to alter the start of screen memory to (in this instance) &4400.

Listing 1 gives a step-by-step demonstration of setting up a screen of reduced size. When run, the program will pause between each stage and the space bar should be pressed to cause the demo to continue.

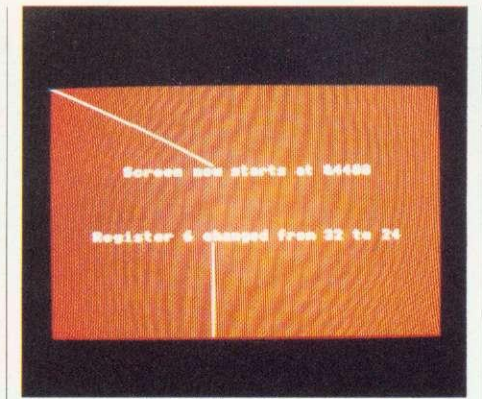
Variables

start%	desired start of screen memory
address%	as above
s%	FOR TO loop counter
line%	as above

Line 140 turns off the cursor.

Procedures

showmemory (line 300) illustrates which part of the screen will store the program data by filling it with a pattern written directly to the screen in line 320.



When using this technique the smaller screen area displayed is moved to the centre of the screen

smallscreen (line 420) sets up a text window of 40 × 24 characters beginning at row eight. It is needed to prevent text overwriting the part of the program stored in screen memory. A graphics window could also be set up should this be required.

changeaddress (line 560): PROC changeaddress(start%) alters the contents of registers 12 and 13 to the new screen address (divided by eight) using the method of directly poking the 6845.

hidememory (line 660) changes R6 from its usual value of 32 to a new value of 24, so blanking off the part of the screen which would be 'corrupted' by program data. It uses the VDU technique but could have similarly been accomplished by changing line 670 to *FX151,0,6 and adding line 671 *FX151,1,24. By changing 24 to, say, 27, you will see how part of the screen reserved for the program becomes visible.

centralise (line 730) centralises the new, small screen by changing the value of register 7. The new value can be found by trial and error. Try changing the 31 in line 750 to different values and notice how the small screen varies its position up or down the screen.

info (line 780) gives a short descriptive message to the user.

space (line 860) causes a delay until the space bar has been pressed.

Incorporating screens

Listing 2 shows how listing 1 can be compacted into a form you can use in your own programs.

It should be loaded first, then Chain the main program. The program has sufficient REM statements and needs no explanation.

The extra memory made available to the programmer using this method often greatly outweighs the fact that the screen is not full size. In *Banjax* a 20 line screen was set up which left an extra 7.5k for program and data – doubling the memory. This allowed a greater variety of large, detailed sprites to be used than would otherwise have been possible.

For further information about the 6845, read chapter 18 of the *Advanced User Guide* (page 359) and *Acorn User*, April 1984.

Robert O'Leary's two listings to shrink your screens are on yellow pages 111 and 112



This standard model 20k screen shows the area used for the shrunken screen (at the bottom) and the area liberated for use by Basic programs (at the top)

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EXTENDING BASIC

BBC Basic offers a wide range of commands and utilities but even so you may want to add more of your own – here's how

Michael Ginns

One of the most attractive features of the BBC micro is the dialect of Basic that it runs. BBC Basic is particularly versatile because of the wide range of commands and functions that it offers the user.

There comes a time, however, when every programmer needs some command or utility which has not been included in the Basic interpreter. For example, a command to list out all the current variables would be useful, as would a command to verify a file once it has been saved. In cases like these what is required is a system by which Basic can be extended to incorporate extra commands.

To some extent this requirement is met by the host of utility programs and toolkit ROMs which are available for the Beeb. These, however, are often general packages, which either do not completely meet your requirements or provide unwanted features which only waste precious memory. Also if the utilities are to be added to Basic, so that they are executed simply by typing the relevant command word, they have to be written in machine code. This makes it impossible for all but the most experienced programmers to adapt, modify or add to the utilities.

The two programs described here, however, allow you to create your own utilities in Basic and then have these added to the commands normally available in the language. The extra functions are called simply by typing an associated keyword in direct mode, as with any other Basic command such as LIST, OLD, DELETE, etc. The utilities program itself is also hidden away in memory so as to be totally transparent, allowing you to load and use other programs as normal.

How does it work? Before that can be comprehended it is necessary to understand how the Beeb interprets commands, and what it does when it comes across a command that it cannot recognise.

When a command is entered into the micro it is compared against a list of Basic keywords held within the Basic ROM. If a match is found then the command is executed. However, if the command is not a Basic keyword, no match will be found and a 'Mistake' error is issued. The obvious way to add commands to the language therefore is to trap this error condition and to check if it was caused by the use of one of the new commands. If it was then the error could be suppressed and the appropriate utility executed instead.

When an error condition occurs, the computer jumps to a machine code error handling routine within the Basic ROM. This routine, after doing some internal tidying up of pointers etc, transfers control to a piece of Basic program text, the address of which is held in locations &16,&17. Normally these point into the Basic ROM itself to an address where the program in figure 1 starts.

This program provides the default handling of errors, which is to print out the error message and the line number if applicable.

The reason for this strange system is that if you set up an 'ON ERROR...' trap within a program, the address of the statement following the 'ON ERROR' command is substituted into locations &16,&17. Thus when an error occurs the computer continues executing the program from the 'ON ERROR' statement instead of aborting the program in the usual way. This can be seen if the following two short programs are typed in and run:

```
10 PRINT ~ !&16 AND &FFFF
```

and

```
10 ON ERROR PRINT
20 PRINT ~ !&16 AND &FFFF
```

The first just shows that locations &16,&17 normally point to the default error text in the Basic ROM. When the second program is run, however, the address printed out is that of the PRINT statement following the ON ERROR trap in the program. This is what will be executed in the event of an error.

My idea was to change locations &16,&17 to point to the program containing our utilities so that it would be executed every time an error occurred.

On trying this, however, I found that the Beeb totally ignored the changes and issued error messages in the normal way. After some hasty disassembling of the Basic ROM I discovered that this was due to the fact that just before interpreting a command in direct mode, Basic resets locations &16,&17 to point to the default error text. What is required therefore is some way of changing locations &16,&17 after the command has been entered, but just before the Basic's machine code error handling routine is jumped to. There is a way to do this.

When a command has been entered and an error detected, the operating system jumps to Basic's error handling routine indirectly through a vector at location &202,&203 (the break vector) as shown in figure 2. If we change the address in this vector to point to our own piece of machine code, then this will be executed every time Basic's error routine is about to be jumped to. This machine code can then change locations &16,&17 to point to our utility program and this in turn will cause Basic to execute the utility program instead of the default error handling text (figure 3).

Listing 1 contains this piece of machine code and is well REMed so it should be relatively easy to follow. The *key 10 definition at line 410 is complicated and should be entered very carefully, exactly as shown. It ensures that the utility program is relinked into Basic after Break has been pressed. The system will not, however, survive a hard reset (CTRL-Break) as this clears the function keys. The reason for this approach rather than using *FX commands to intercept Break, which would survive a hard reset, is twofold. First, the *FX commands required are not implemented in operating system 0.10, but more importantly, if for some reason you corrupt the machine code used to intercept Break, or the utilities themselves, then when Break was pressed the computer would 'hang up' and have to be turned off.

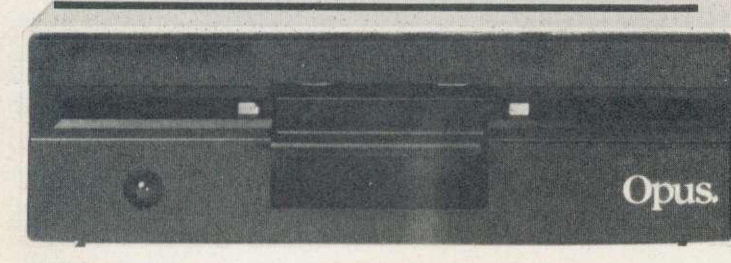
With Basic's command interpreter successfully intercepted we can now turn our atten-

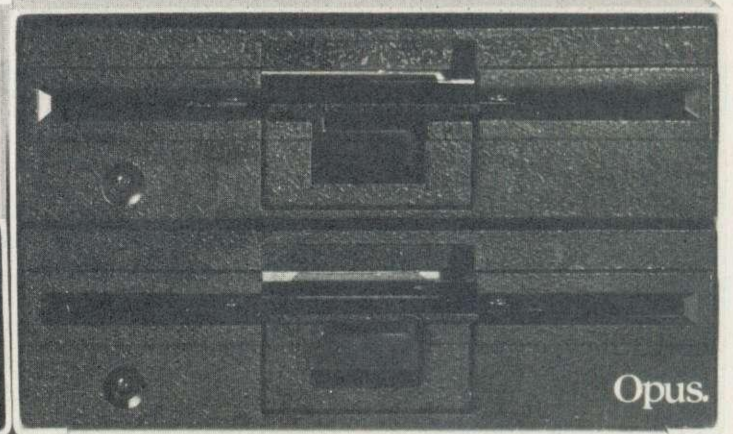
```
REPORT
IF ERL<>0 PRINT"at line";ERL
PRINT
END
```

Figure 1. Basic's default error handling text

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tion to the utility program itself. The utilities are each held in separate Basic functions (FNs) which are placed one after another to make up the utility program. The names given to these functions are the words which will call the respective utility when entered from the keyboard. Thus a function started by the definition DEF FNVERIFY will be executed every time you type VERIFY. Any word can be chosen for a command in this way except for existing Basic keywords, eg, HIMEM, MOVE, etc.

Preceding the utilities in the program should be the lines listed in listing 2. These are responsible for examining the command that was entered and if possible calling the relevant utility function. The command that you entered which caused the original error is derived by examining what is known as the keyboard buffer. As characters are entered from the keyboard they are placed consecutively in the keyboard buffer which stretches in memory from &700 to &7FF. Figure 4 shows the buffer after VERIFY has been entered.

Since our new commands cannot be part of multiple statement lines (cf OLD, DELETE, RENUMBER, etc), they must start at location &700 and be terminated by a return character (CHR$13). Therefore the string returned by the function $&700 will be the last command entered. This string is then used by the program to execute the utility function of the same name using the EVAL statement.

The BBC micro User Guide says that the EVAL command is used to return the result of evaluating a string of characters. For example, the following would set A to equal 3, the square root of 9:

B$ = "SQR(9)"

A = EVAL (B$)

However, user defined functions (FNs) can also be evaluated in this way, so:

A = EVAL ("FNaverage")

is quite legal and will set A to the value returned by the function 'average'. The string to be evaluated can also be made up from two separate strings added together. This helps us a lot as we can now say:

A = EVAL ("FN" + $&700)

This will set A to the value returned by the function whose name is held in $&700, for example if $&700 = "VERIFY" then the EVAL command makes A equal to FNVERIFY and the VERIFY function is executed. The actual numeric result returned is unimportant and is not used in listing 2, but nevertheless it is an excellent way of calling the function corresponding to the command entered without resorting to endless statements like 'IF $&700 = ... THEN PROC....'.

If there is not a function in the program with the same name as the command entered then a genuine mistake has been made as opposed to one of the new commands being used. In this case when the function is called a 'No such FN/PROC at line 100' error will occur. However, the ON ERROR trap set up at the beginning of listing 2 will cause the computer to jump to line 130. Here, since ERL will equal 100, a Mistake message will be issued. Finally the program restores the value of PAGE to its previous value (Hi-byte stored in location &8F) and the computer is returned to command mode by the END statement.

How to use the programs

Type in listings 1 and 2 (excluding REMs and assembler comments) and save them as LANG1 and LANG2 respectively. As they stand these programs will not add any commands to Basic as listing 2 does not contain any utility functions. To add these, LOAD listing 2 and type in the required utility functions one after another at appropriately spaced line numbers. Each function should be started by the statement 'DEFFNcommand' where command is the keyword required to call the utility. Following this should be the program lines which actually make up the utility (see the list of programming rules that must be observed). Finally the utility should be terminated by the statement '= 1'. When the necessary functions have been added, the program should be saved again.

To use the extra commands, load and run listing 1. A message should be produced indicating that all is well. When this has finished load in listing 2 and when loading is complete, simply press Break. You should be greeted by the following message;

BBC Computer
BASIC
Extended Mode
>

If this does not appear check the steps described previously.

The utilities in listing 2 are now all available, and can be called by entering their associated

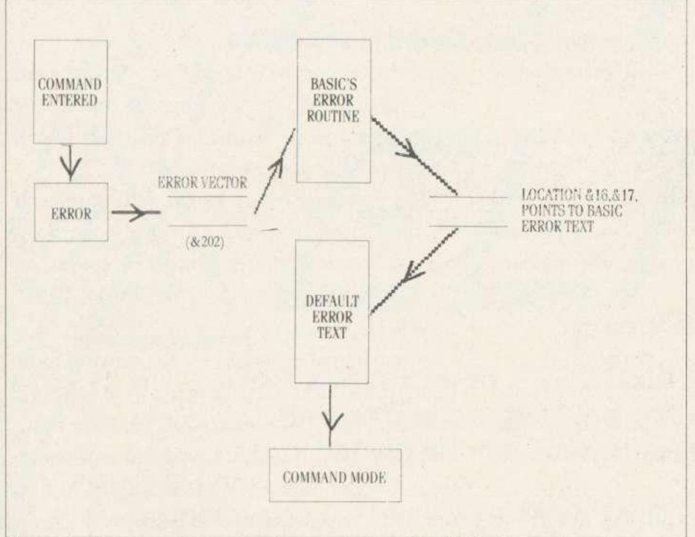


Figure 2. The normal error handling system on the BBC micro

	&700	&701	&702	&703	&704	&705	&706	. . .	&7FF
ASCII	V	E	R	I	F	Y	.		
DECIMAL	86	69	82	73	70	89	13		

Figure 4. The keyboard buffer after VERIFY has been entered

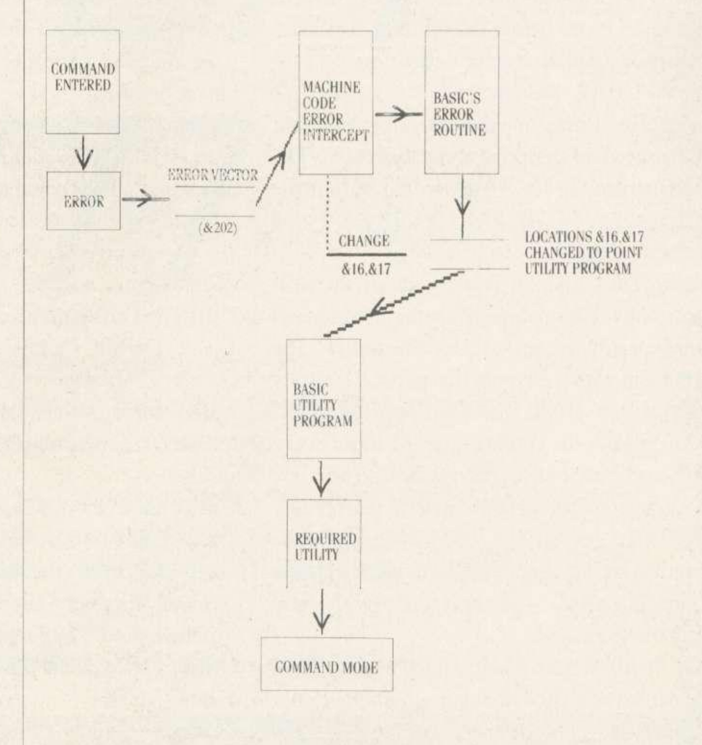


Figure 3. The error handling system intercepted to allow new commands

keywords. Further commands can be included by adding the necessary functions on to the end of listing 2, following the procedure described, and re-saving it.

To get the ball rolling I have included 11 utilities which can be added to listing 2 to be used with the system. These are useful as they stand, providing many of the commands missing from BBC Basic, but also because they include many programming techniques which you will require to write your own utility functions. If the descriptions of these utilities are read, together with the programming rules, you should not experience any difficulty in writing extra utility functions which will work in the system. I should like to stress that the utilities given are only an example of what can be done. The whole point of the system is the ease with which utilities can be added, deleted or modified.

Description of example utilities

Utility 1: Amount of memory left
Syntax: MEMORY <no parameters>
Description: Prints out the amount of memory that you have left in bytes taking into account memory used by variables.

Utility 2: Current program size
Syntax: SIZE <no parameters>
Description: Prints out the current size of your Basic program in bytes.
Notes: This function shows how the value of PAGE should be used. If you need PAGE's value, you should not access the variable itself as this has been reset by the utility program. Instead the statement 'original _ page = ?&8F * 256' will give the correct PAGE setting, as it was before the utility was called.

Utility 3: Read character definition
Syntax: CHAR <character>
Description: Prints out the character definition of the specified character in the form of a VDU 23 statement; eg CHAR 65 would output the following: VDU 23,65,1,2,3,4,5,6,7,8 – the character definition of an 'A'.
Notes: This function is very important as it shows how parameters following a command can be extracted for use by the utility. The command which triggers this particular utility is the word CHAR, which has four letters. As we have seen the command word starts in the keyboard buffer at location &700, so any text or parameters following it will be returned by $&704. In general $(&700 + length), where length is the number of characters in the utility command word, will always return the text after the command.

If the parameter is numeric, this string will have to be evaluated to obtain a numeric result. This should be done using the EVAL statement rather than the VAL statement, as at line 3020. This is because the EVAL statement allows variables and hex numbers to be given as parameters, eg, CHAR &20 or CHAR C, where as VAL only permits numeric constants like CHAR 65 to be used.

This function also raises the point that once the command and any parameters present have been extracted from the keyboard buffer, the whole of memory from &700 to &7FF is unused and is available to the user's function. In this case it is used to hold a parameter block for an OSWORD call which reads the character definitions.

Utility 4: Verify basic file
Syntax: VERIFY "filename" (quotes are compulsory)
Description: This command not only ensures that the file specified is readable but also checks that it is an exact copy of the Basic program currently in memory. It should be used directly after saving a file. Remember this command will only verify a saved Basic program.
Notes: This function illustrates the extra error handling facilities which may be needed, as described in the programming rules.

Utility 5: List all variables
Syntax: LVAR <no parameters>
Description: When this command is entered it produces a list of all the dynamic variables currently defined together with their values.

Utility 6: Convert number to binary
Syntax: BIN <var>
Description: Outputs the binary equivalent of the specified number. The range of var is 0-255.

Utility 7: Convert number to decimal
Syntax: DEC <binary number>
Description: Performs the opposite function to BIN, outputing the decimal of the specified binary number.

Utility 8: Silence specified sound channel
Syntax: SILENCE <channel>
Description: This command silences any note sounding on the specified channel and removes any notes currently queuing for the channel. Channel range is 0-3.

Utility 9: Dump an area of memory
Syntax: DUMP <address>,<address>
Description: Dumps to screen, in both hex and ASCII format, memory starting from first specified address and ending at the second address.

Utility 10: Print out function key definition
Syntax: KEY <function key number>
Description: Prints out the text assigned to the specified function key. Keys 0-15 may be specified, (keys 11-15 refer to the editing keys).

Utility 11: Turn off Basic extension
Syntax: RESET <no parameters>
Description: Turns off the added Basic commands, returns the machine to its normal state.

Programming rules

The following are a set of programming rules which you must observe when writing your own utilities if they are to work effectively in the system.

Variables. Any variable set up in a utility will appear among your main variables when the utility is called. If you have already set up a variable of the same name then its value will be corrupted by the utility. For this reason all variables used in a utility function should first be declared LOCAL to the function to protect the values of existing outside variables.

Subroutines. Should a utility function need to make use of a subroutine, it should do so by using a procedure rather than another function. The only functions which appear in the program should be those containing the utilities. This is because any function present will be called if its name is entered from the keyboard. This could prove disastrous if the function did not contain a utility and was not meant to be called directly in this way.

Error handling. If an error occurs in a utility function, for example if a command requiring a parameter is issued without a valid parameter, then the ON ERROR trap of listing 2 will ensure that the error is reported, PAGE reset, and command mode returned to. However, if anything else has to be done, eg, files have to be closed in the VERIFY utility, then you should set up your own ON ERROR trap at the beginning of the utility function. After performing all the necessary tasks this should end with the statement GOTO 140 which ensures a clean return to command mode.

Entering commands

Commands must be entered from the keyboard and not included in programs. If one of the new commands is used in a program it will simply produce an error message.

The command must be the first command on the current line and no other commands must follow it even if separated by colons, ie, no multiple statement lines (cf, OLD, LIST, DELETE, etc).

Any parameter needed by a command must be separated from the command by at least one space, eg, KEY 1 instead of KEY1. If the latter is entered then the utility program will search for a function called KEY1. It will fail to find one and a mistake error will be issued.

If after pressing the Break key you use any of the new commands without first typing OLD then your Basic program will be corrupted. This is the same as setting up a variable after pressing Break. So remember to enter OLD after pressing Break.

Michael Ginns' two listings are to be found on yellow pages 112 to 114

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Interested in writing sideways? This article shows you how to write very long machine code programs for use in memory or sideways RAM

Steve Picton

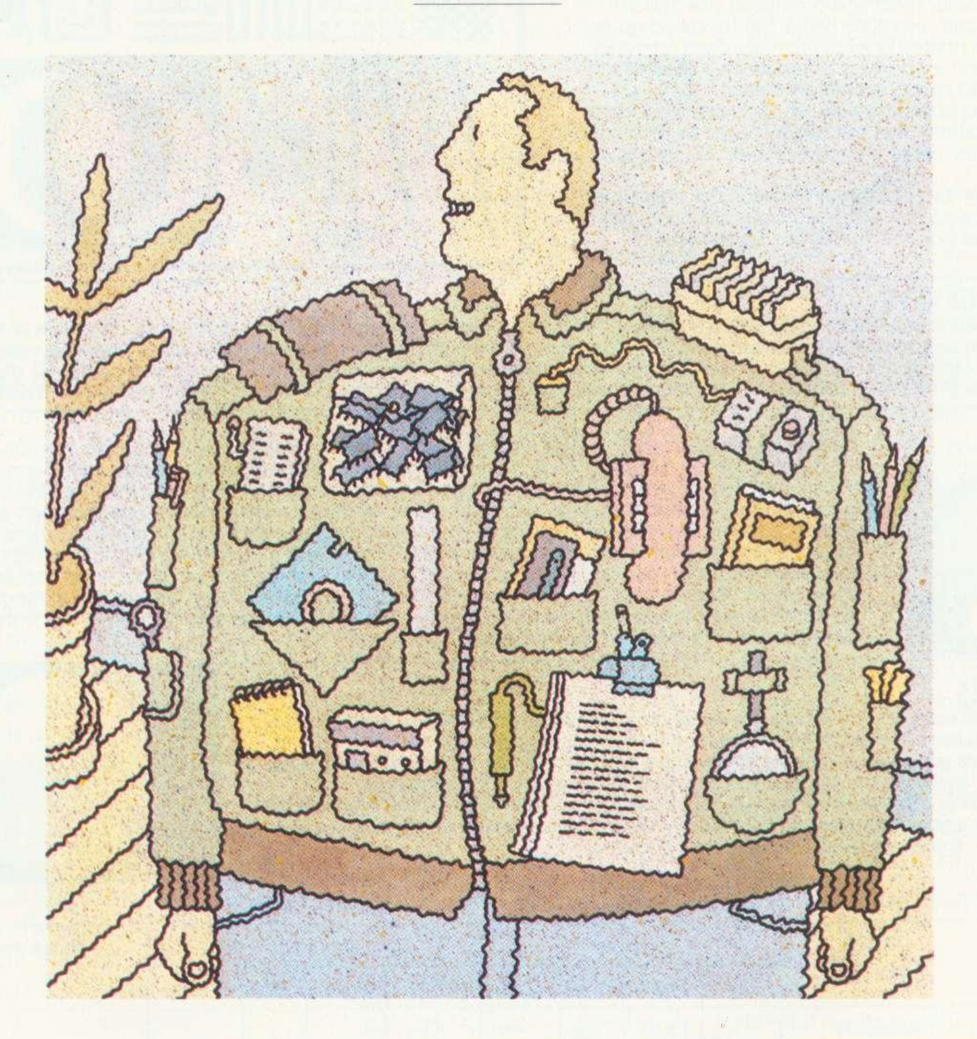


ILLUSTRATION BY JIM MAWTUS

Over the past few months, *Acorn User* has been looking at the format of sideways ROMs and provided several handy utilities which show just how versatile sideways RAM chips can be. By now, the benefits of RAM over EPROM for development work should be clear: 16k of RAM may be written to in a matter of moments, instead of the several minutes associated with programming a ROM, and the days are gone when you had to wait for half an hour while your entire EPROM was erased, just because one bit was wrong. Of course, the techniques described here don't only apply to sideways RAM and could certainly be used to write very long machine code programs for use anywhere in the Beeb or Electron's memory.

The popularity of *AU's* User RAM offer and sideways RAM boards in general shows that a lot of people want to write their own utilities. There are plenty of 16k firmware packages around which prove that a great deal can be done with 16k of machine code (eg, Basic), and there is no shortage of good 8k material either. In principle, writing such length of code isn't a problem – it just means writing a lot of assembly language.

The inbuilt assembler on the BBC micro makes life very easy for those wishing to begin programming in assembly language. For anyone contemplating writing a complete 8k or 16k ROM, the main difficulty is the restriction on the amount of machine code that you can apparently create with it. This is simply a consequence of the way in which it operates. It expects the source (assembler) code to be resident in memory, and creates the object (machine) code in memory also. At any one

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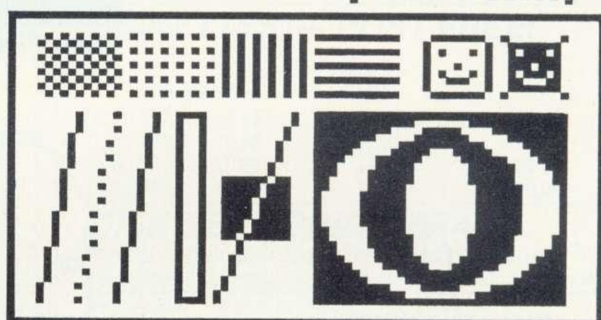
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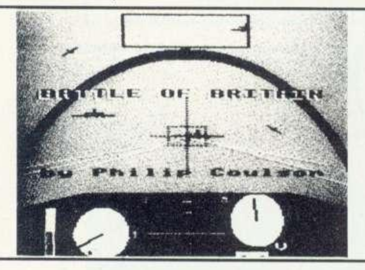


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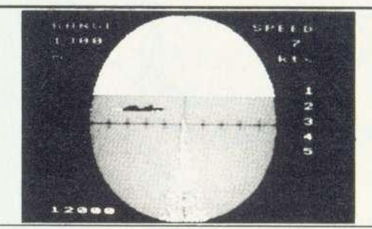
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time therefore, the available memory has to be shared between the assembly language, the resulting machine code, variables, etc, and this would seem to impose a considerable restriction on the length of code that it is possible to generate.

When entering an assembler program, the technique of using one mnemonic per line is fine in terms of clarity, but it doesn't make best use of available space. Every extra line in your program consumes another four bytes of valuable memory, just to contain basic information about the line itself. Typically, the one-mnemonic-per-line approach will generate object code that is about one-tenth of the length of the original assembler listing. So to produce 16k of machine code, you'll need about 160k of text. If the computer only has 32k of RAM anyway, clearly the direct approach just isn't going to work. Even after you have removed all the comments and redundant spaces from the assembler listing, created multi-statement lines and so on, you can only obtain a ratio of about 5:1. This is certainly an improvement over 10:1, but it still makes creating even 4k fairly awkward.

A number of software suppliers have been quick to spot this deficiency, and introduced ROM-based assemblers of their own. These can take the source (assembler) listing straight from disc, and write the object (machine) code direct to another file. They usually offer extended facilities too, such as text editors for producing the assembly language in the first place. But products such as these will probably set you back about £60 for a decent one.

The purpose of this article, then, is to show how you can generate 8k, 16k or even larger amounts of machine code, using nothing more than the Beeb's standard mini-assembler and a bit of low cunning. The technique is equally suited to tape users, but inevitably the process is more rapid and convenient with discs.

It is clear that we will need at least 40k of assembler if we want 8k of machine code. Since a program of this length won't fit inside the computer, we have no alternative but to split it up into small pieces. In one sense this is probably a good thing, as it is easier to debug smaller, more manageable segments. You can then work on your disassembler, memory editor or whatever as separate entities.

As soon as we divide the program up in this way however, we run into a problem. The difficulty is that we may have a subroutine somewhere which must be called from several different places. We obviously can't include this subroutine in each segment, as that would be extremely wasteful on space. In any case, writing a subroutine several times over defeats the purpose of it being a subroutine at all.

For example, suppose you were going to write a ROM which included, among other things, a disassembler and a memory dump. A routine that might well be required by both programs would be one which printed out the contents of the accumulator as a two-digit hex number. If you include that routine in the disassembler, then you don't want it appearing in the memory dump and vice versa. But when you work on the program which does not actually contain the routine, you cannot call or jump directly to it, simply because you have no idea of its absolute address.

The fundamental requirement is that we should be able to preserve all the important addresses from one program to the next. Loading or chaining in a new program destroys the values of the current variables, so when a subroutine is assembled, we must somehow make sure that its address can be made known to a completely new program. Whenever that new program wants to call a subroutine, it is only necessary to retrieve its address, and then JSR there. We should never have to assemble a particular subroutine more than once. Forward references, while being a bit more fiddly, can be taken care of as well with a little ingenuity.

The resident integer variables are immune from the effects of loading in a new program, so let's give a quick example of how it all works using S% and T%.

Enter the following short program:

```
10 beep=S%
20 star=T%
30 [
40 JSR beep
50 JMP star
60 ]
```

Save this as PROG2. Type NEW, and enter:

```
10 DIM code 20
20 P%=code
30 [
40 .S% \beep
50 LDA #7
60 .osasc
70 JMP &FFE3
80 .T% \star
90 LDA #&2A
100 BNE osasc
110 ]
120 CHAIN "PROG2"
```

Now RUN it, and notice how the first program above (saved as PROG2) has access to the addresses of 'beep' and 'star' by means of S% and T% respectively.

So having restored the address of the beep routine (beep = S%) we can safely use JSR beep in the main text.

What about forward references, where we need to jump to an address further on in the ROM? Have a look at the two programs below to see how these can be accommodated. PROG3 has to JSR to a routine in PROG4 which occurs after it.

```
10 REM PROG3
20 code=&3000
30 P%=code+1
40 ?P%=&20:REM Opcode for JSR
50 [
60 .S% \ Address
70 BRK:BRK \ Two-byte dummy
80 RTS
90 ]
100 CHAIN "PROG4"
```

```
10 REM PROG4
20 [
30 .routine
40 LDA #7
50 JMP &FFE3
60 ]
70 ?S%=routine MOD 256
80 ?(S%+1)=routine DIV 256
```

The idea is simply to create the JSR opcode by placing &20 in memory. The next two bytes will eventually contain the address of the subroutine itself, but the address is unknown initially. We reserve two bytes, however, (using BRK:BRK or EQUW0) so that there is room for it to be inserted later on. S% will contain the address into which we must write the low order byte of the address of the subroutine (called 'routine' in this example). The high byte therefore goes into S% + 1.

At the instant PROG3 reaches line 100, the machine code at &3000 will effectively read:

JSR &0000: RTS

As soon as the correct address of 'routine' is established, it is written into memory using the '?' operator. This is done in lines 70 and 80 of PROG4.

These techniques are limited in their usefulness only by the number of resident integers available. An extension of this idea is to use a numeric array element for a label, instead of the more common alphanumeric variety. For example, both:

.printinhex and

.M%(17)

are valid labels. Likewise:

JSR output and

JSR M% (29)

would be acceptable instructions. Of course, you would need to dimension the array first.

Any subroutine which you need to call from several different parts of the ROM should therefore have an array type label attached to it. It is also best to put them at the start of the ROM, so that their addresses can be generated early on.

Before the next piece of code is loaded in, it is vital that the numbers in the array are saved somewhere. They will be lost otherwise. They

can, of course, be written to a file, but it is easier (and quicker) to put them away in a corner of memory somewhere. We can do this using the pling (!) operator.

BBC Basic uses four bytes to store the value of any integer quantity, including an integer array element. But numbers which are generated using the above method will only be memory addresses, and so will need just two bytes to represent them.

This means that you can store the addresses of 150 different subroutines in a mere 300 bytes of memory.

Suppose you have an array created with DIM M%(150). Assuming each element contains a number less than &10000, you could save these from &900, say, onwards by using:

```
1000 FOR N%=0 TO 150
1010 ! (&900+2*N%)=M%(N%)
1020 NEXT N%
```

M%(0) is stored in &900 and &901, M%(1) goes in &902 and &903, etc. To retrieve an address, simply use the ! operator again, ANDing the result with &FFFF. For instance, the original value of M%(126) is given by:

```
(!(&900+2*126)) AND &FFFF
```

Whenever you use an array type label, be sure to make a written note of its purpose. A label such as '.stackpush' is meaningful, but '.M%(47)' is not. A list of which subroutine does what, together with entry and exit conditions, will be invaluable at a later date.

This month's yellow page listings include a program to implement a password feature. A number of software houses offer a service whereby your own name/password is embedded into a ROM. In essence, this is simply a routine which asks the user for a password, and checks that it matches the internal one before the machine can be used. Normally this should only be done at power-on, but since most sideways RAM systems don't have a battery back-up facility, it occurs in this example after a CTRL-Break. Exactly what the program does is not too important. The main purpose is to show how the utility can be written as several separate listings, and still produce a correctly assembled program.

The first contains the standard header code, so that the operating system will recognise the ROM, and the remaining code is split between a number of different programs.

As written, the programs will work with either Basic 1 or 2. Basic 2 users should recognise certain shortcuts in the form of the EQU pseudo-op, and the offset assembly facility made available by using O%. On the question of whether it is worth upgrading from Basic 1 to 2, then the answer is almost certainly yes, particularly if you intend writing any appreciable length of ROM-based code.

The program works by checking for a 3 in the accumulator during the service routine. This is actually the auto boot service, but we use it here simply because it indicates that Break has been pressed. OSBYTE 253 is issued in order to ascertain the type of the last reset. On exit, the X register contains 2 if a CTRL-Break has occurred, and a zero if it was an ordinary Break. X being 1 indicates a power-up reset, although we do not need this information here.

We have to check for a soft Break in order to prevent the user from simply pressing Break when the password is demanded. Clearly, we need to be able to know that Break has been pressed at this moment as opposed to any other. The way this has been done here is as follows. When the password is requested, a group of five bytes is copied down to the bottom of the stack. If the password is given correctly, these bytes are then deleted before proceeding further. When a soft Break is detected, however, the program examines the numbers in the stack. If they match the numbers in the ROM, it is a fair bet that the user is trying to circumvent the password protection. In this case, the prompt for the password reappears. On the other hand, if any one of the five numbers is different then the routine exits as usual, since this would suggest that it is nothing more than an ordinary Break. It is highly unlikely that the stack will contain the unique five numbers during the normal course of events.

Relative addresses

The programs give rise to a few 'forward references', and how to deal with these has already been mentioned. Branch instructions are used here rather than jumps, so we need to know how to calculate a relative address. The offset associated with branch instructions are two's complement numbers (see below), referenced to the byte after the instruction itself. For example, if a BCS opcode occurred at &3000 and we wished to branch to &3057, the number representing the relative address would be &3057−&3002, or &55. Three calculations such as these are performed in lines 600 and 610 of PROG2 and line 330 of PROG3, although in a slightly different manner. Notice that no check is made for the branch being 'out of range'.

FOOTNOTE: Two's complement is a technique which allows us to represent negative numbers in binary. The system is known as signed binary and may use any number of bytes, the only proviso being that the most significant bit of the bytes, (ie, the one to the extreme left) is used to represent its sign. A 1 indicates a negative number; a 0 a positive number. Relative addresses are 6502 branch instructions (ie, BNE, BMI, etc) followed by a byte which represents the displacement the microprocessor should move to reach the correct address. As we need to be able to branch either backwards or forwards we need to be able to distinguish between positive and negative numbers. The maximum forward branch permissible is 129 and the maximum backward branch is 126. (The slight discrepancy in these numbers is due to the fact that the BNE XX or whatever, must also be jumped over.)

Numbers in the range 0 to 127 are easy to convert into positive values. Simply clear the most significant bit of the byte and then calculate the correct binary. Thus 7 would become: 0000 0111; similarly 64 would be 0100 0000.

Converting negative numbers is more complex. There are three rules:

1 First forget the negative sign and then represent the number in binary. Thus −3 becomes 3 which is 0000 0011.

2 Now invert all the bits. Replace 1s with 0s and vice versa. Thus 0000 0011 becomes 1111 1100.

3 Add 1 to the result:

```
  1111 1100
+         1
= 1111 1101
```

Thus −3 in two's complement is 1111 1101 binary or &FD.

Jargon box

Assembler: This is the part of Basic that converts the machine code mnemonics into the actual machine code. The machine code is stored from the address pointed to by the variable P%.

EPROM: a chip that may be programmed with machine code or data. Once programmed the machine code or data is stored there until it is erased using an EPROM eraser. Its contents are not lost when the micro is switched off.

Firmware: The term given to software that is provided in a ROM or EPROM.

Mnemonic: An abbreviated term for a machine code instruction, ie, LDA is the mnemonic for LoaD Accumulator.

Object Code: This is the name given to the machine code generated by the assembler.

Service call: These are issued by the Machine Operating System (MOS) to various ROMs. The ROM should identify the service call number and act on it accordingly. Details of service calls can be found in Richard Harris' sideways RAM article in the June 1985 issue of *Acorn User*.

Source Code: This is the name given to the assembly language listing used to generate the machine code.

For Steve Picton's listings, see yellow pages 114 to 116

COMPETITION

DECIPHER THE DATA

Sort out who's who and win Bruce's bumper book

Simon Dally

The popular press is fond of criticising police bungles like the Yorkshire Ripper case on the grounds that they got swamped by their own paperwork and 'didn't use a computer'. In fact, as most of us know, it's easy to use a computerised database when every entry is standard – eg, name, date of birth, address, date of last purchase, etc – but far from easy when you're trying to assimilate thousands of disparate pieces of information.

The system 'Sherlock', now used by the police in cases like the Yorkshire Ripper where searching for the offender is like looking for a needle in a haystack, is said to take an impressive step towards solving this problem of coping with an enormous mass of loosely-structured information.

This month's problem involves coping with lots and lots of data and coming up with the right answers.

Five programmers from a software company spend a week assessing a manufacturing company's software requirements. The programmers are called Arnold, Baker, Williams, Andrews and Curtis, while the five factory employees with whom they liaise – a chief engineer, a machine operator, a supervisor, a marketing director and a production head – bear the same five names in some order. In the lunch hour they like to forget about the job and indulge in some hands of poker. At the end of the week it is further known that:

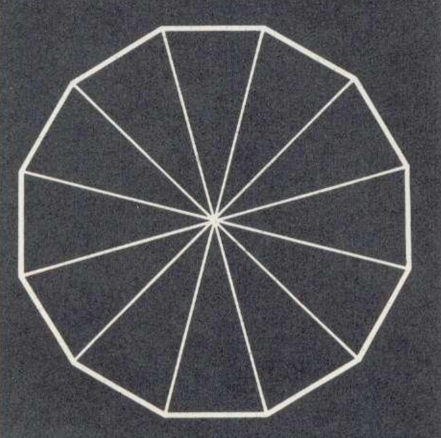
1 The programmer Arnold won £10.60 more than the marketing director did.

2 There is a difference in age between the programmer Curtis and the chief engineer, of five years to the day.

3 The programmer Williams is not related to the supervisor's namesake, even by marriage.

4 Last week, the machine operator was disciplined for a failure to report to work. In the company journal the offender was identified only as a factory employee and by his initials, but it was impossible to imagine that the marketing director could have been the culprit.

5 The programmer Curtis is precisely as old as the chief engineer was when the programmer Baker was as old as the factory employee Andrews was when the chief engineer was as old as the factory employee Andrews now is.



'The BBC Micro Advanced Reference Guide' by Bruce Smith is a complete guide to all aspects of the BBC B and B+, containing a wealth of information. It's easy to use – and we're giving away 25 copies

6 One of the programmers is the son of one of the factory employees. The production head is married to the mother of the programmer in question.

7 The chief engineer is a neighbour of the machine operator's namesake.

8 The supervisor and his maternal grandfather celebrate their birthdays on the same day.

9 The machine operator differs in age by less than $2\frac{1}{2}$ years both from his namesake and from the chief engineer.

10 The marketing director's eldest grandson is married to a sister of the programmer Curtis, while the marketing director's youngest grandson is married to the mother of the chief engineer's namesake.

11 The programmers Baker and Andrews live in Slough.

12 The production head had winnings exactly one quarter of his namesake's winnings, and the marketing director had winnings exactly one fifth of his namesake's winnings.

13 The marketing director's namesake celebrates his birthday one week before the factory employee Andrews.

14 The supervisor is married to a daughter of the programmer Arnold.

15 The factory employee Andrews' mother's father was born on the same day as the programmer Williams.

16 One of the programmers is the father of one of the factory employees.

17 The chief engineer differs less in age from the production head than from any of the eight other persons.

18 The factory employee Andrews won £2.80 more that the factory employee Arnold did; the factory employee Williams won £3.25.

19 The factory employee Arnold lives in London.

20 Two of the factory employees won £6.60 each.

The questions

A What are the names and winnings of the factory employees?

B One piece of information in this list is superfluous. Which one is it?

Answers on a postcard or back of an envelope, including the coupon below, please, to Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH, to arrive not later than 31 January 1986. The first 25 correct entries pulled out of the postbag after that date will win the senders copies of Bruce Smith's complete and authoritative *The BBC Micro Advance Reference Guide*, published by Collins at £10.95.

Now for a few general remarks about our competitions. Please don't include questions, articles or programs you hope *Acorn User* will publish with your competition entry. All entries go into a box which isn't opened until after the closing date, so at the very least you'll have to wait before anyone looks at it, and if it's a competition which attracts several thousand entries and the winners are the first correct solutions out of the box, the chances are your work won't even be seen! And do remember to include your name and address.

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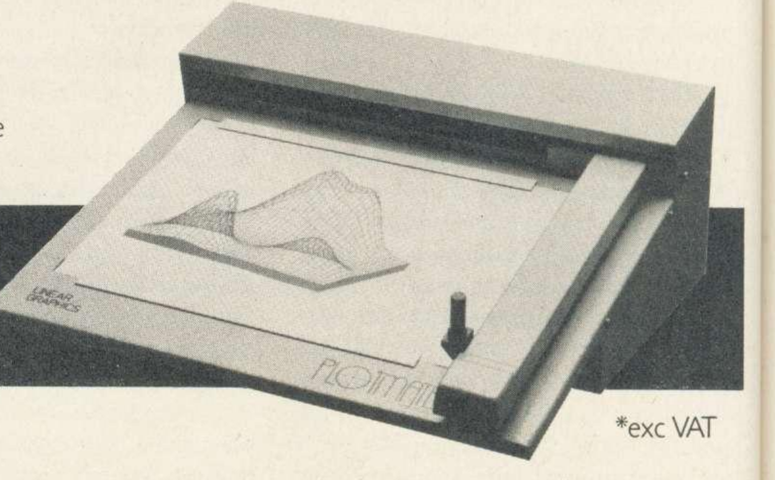
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CHEAT AT ELITE

The sneaky *Elite* freaks round off their tips on how to succeed at Acornsoft's popular game, by presenting their *Elite* Commander Editor to help you

Paul Skirrow and Paul Springate

This month, we introduce you to the *Elite* Commander Editor, a Basic program that allows you to edit an *Elite* Commander file. It can be used with the disc and cassette versions of *Elite*, and has been tested on Basic 1 and Basic 2, and on a second processor. If using it with the cassette version you have to remove the "E." + from the OPEN statements. It will also work on the Electron version of the game without any alterations.

Table 1 on page 96 lists the bytes in an *Elite* Commander file. You cannot change the file directly, as bytes 4A and 4B contain a special key which is calculated from the data in the rest of the file. If any data is changed, the key must be recalculated. *Elite* calculates the key every time it saves a Commander and checks it every time it is loaded. If the key is not correct, *Elite* will stop. The Commander Editor calculates the key in the same way as *Elite*, before saving the file.

The Commander Editor is very simple to use. After typing it in and saving it, type RUN to run it. It first asks for the name of the old commander (ie, the fuel to be input). Pressing Return will use the data for Commander Jameson (which is in the program itself, so doesn't need to be loaded from disc). It then asks for the name of the new commander (ie, the file to be created). If Return is pressed, it will use the name of the old file. If a different name is given, then a new file will be created and the input file will be untouched.

The 76 bytes of the file used by *Elite* are displayed and can be changed by moving the cursor to the relevant byte and entering new data (followed by Return). All numbers are in hexadecimal, and the left-hand column is merely for reference purposes. The byte at the cursor is described at the top of the screen, and you will learn very quickly where the important data is stored.

The cursor is moved using the cursor keys in the normal way (it wraps round at the edges), or by using the Return key which moves the cursor to the next byte. All data should be entered as a hexadecimal number



Bytes in a commander file waiting to be changed

unless the program indicates otherwise – for example, 'Energy Bomb fitted (Y/N)' or 'Docking Comp's fitted (Y/N)'. In these cases type Y or N followed by Return.

The only other exception is money, which should be entered as a decimal number (in the range indicated).

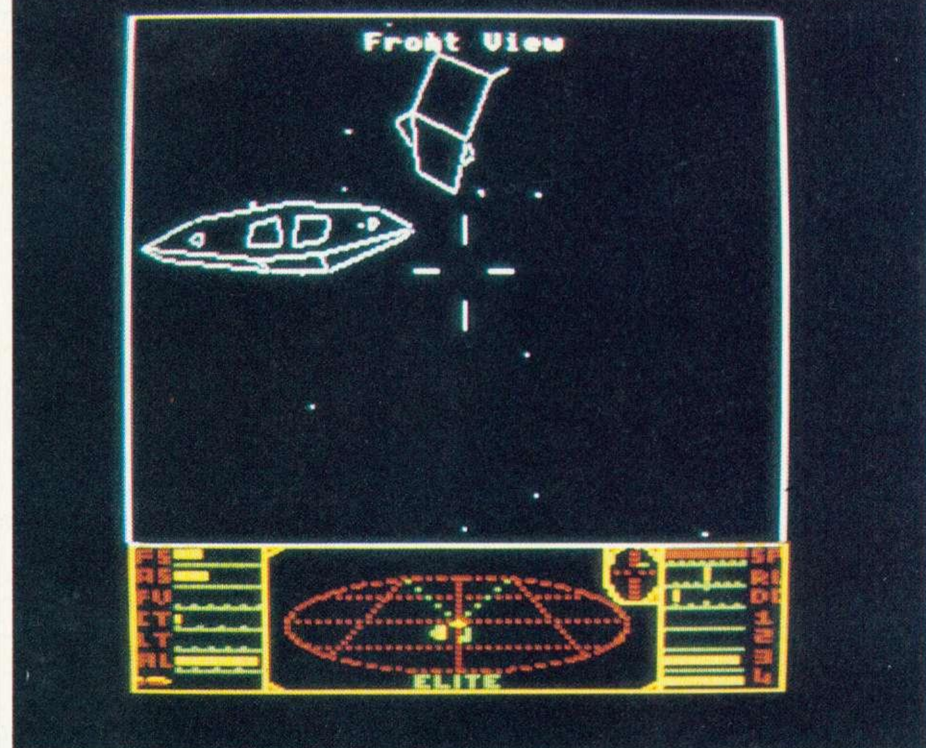
When you have finished editing the Commander, press Escape.

The Commander file

Most of the bytes in the Commander file are described below, although there are still a few we aren't sure about. We leave it to you to discover what they are used for!

00 The 'Mission Control' byte should be in the range 0-E. It starts at 0; then when you are given the first mission, it becomes 1. Changing this directly isn't very useful, although setting it to A will give you lots of Thargoids. The best way to get the first mission is to make sure that this is 0, and then set your score to, say, 1800. Setting it to 9 and setting your score to 1800 will give you a second mission. You must be in galaxy 1 to get the first mission and galaxy 3 for the second. You will receive a message about the mission as soon as you dock in a space station.

01-02 The ship's X and Y co-ordinates can be set to any value (0-FF) and need not be those of a planet as they will be



You must decide if you use the *Elite* Commander Editor, or gather credits the hard way

changed to the co-ordinates of the nearest planet when loaded.

03-08 The galaxy data bytes control the layout of the stars in the current galaxy as well as the names of planets. By changing these, it is possible to create galaxies where every star appears on top of another.

09-0C Credits (enter a decimal number less than 429,496,729.5).

0D The amount of fuel can be set to anything from 0 to 25.5 light years (FF). The number in the file is the distance divided by 10 (ie, FF is 255 which divided by 10 is 25.5). 25.5 light years radius looks very impressive on the galactic chart, but be careful if you set it to more than 7 light years, as sun skimming, or buying more fuel sets it back to 7.

0E This byte is over 80 if the Commander file has been edited, but less than 80 otherwise. This allows Acorn (and you) to detect edited files.

0F This is the galaxy number minus 1. However, changing this doesn't change the planets in the galaxy; it merely changes the number displayed. So, to get the proper planet names for galaxy 3, for example, you should set this to 1 and use a Galactic Hyperspace as soon as the game is loaded.

10-13 Laser power. This is 00 if no laser is fitted, 0F for a pulse laser, 32 for a mining laser, 8F for a beam laser and 97 for a military laser. Any other value is called a 'pulse laser', so setting it to FF gives you an *extremely* powerful pulse laser.

16 Cargo capacity plus 2. Setting it to FF gives 253 tons cargo bay capacity.

17-27 Present cargo. The amount of each type of cargo you are carrying.

28-2E Ship's equipment. To change these, enter Y or N. The exception is the energy unit (byte 2B). This is 0 for no energy unit, or 1 for a standard energy unit. Other values give more powerful energy units, but don't be too greedy because the ship's energy is increased only when the energy is low enough to accept this amount.

33 Number of missiles (normally 0-4). More than 4 are allowed, but part of the console may be overwritten when they are used.

34 Legal status. 00 if you are 'clean', anything higher is 'offender' or 'fugitive'.

35-45 Quantity of space station's goods. The 'quantity of aliens' byte is set to 0, so changing it has no effect.

46 Adjusts the space station's prices. It is saved to disc so that the prices are the same next time you load the Commander, but are changed when you switch to a new system.

47-48 Score. This was described in last month's article. *Elite* rating is given when you score 1800 (hex).

49 This starts at 80 and is halved each time the game is saved.

4A-4B Special key. This is set by the Commander editor, and *Elite* when the Commander is saved.

4C-FF Not used by *Elite* 1 (all bytes are 00).

See yellow pages 116 to 119 for the Elite *Commander Editor listings*

Hex	Dec	Description
0	0	Mission Control (0-E) 1 = first mission, A = second mission
1	1	Ships X co-ordinate within the galaxy (0-FF)
2	2	Ships Y co-ordinate within the galaxy (0-FF)
3	3	Galaxy Data byte 0
4	4	Galaxy Data byte 1
5	5	Galaxy Data byte 2
6	6	Galaxy Data byte 3
7	7	Galaxy Data byte 4
8	8	Galaxy Data byte 5
9	9	Credits (decimal, < = 429,496,729.5)
A	10	see creds
B	11	see creds
C	12	see creds
D	13	Amount of fuel in units of 0.1 light year
E	14	Over 80 if file has been edited
F	15	Galaxy number — 1
10	16	Front laser power (00, 0F, 32, 8F, 97)
11	17	Rear laser power (00, 0F, 32, 8F, 97)
12	18	Left laser power (00, 0F, 32, 8F, 97)
13	19	Right laser power (00, 0F, 32, 8F, 97)
14	20	?
15	21	?
16	22	Cargo capacity +2
17	23	Present Cargo: Food (tons)
18	24	Present Cargo: Textiles (tons)
19	25	Present Cargo: Radioactives (tons)
1A	26	Present Cargo: Slaves (tons)
1B	27	Present Cargo: Liquor (tons)
1C	28	Present Cargo: Luxuries (tons)
1D	29	Present Cargo: Narcotics (tons)
1E	30	Present Cargo: Computers (tons)
1F	31	Present Cargo: Machinery (tons)
20	32	Present Cargo: Alloys (tons)
21	33	Present Cargo: Firearms (tons)
22	34	Present Cargo: Furs (tons)
23	35	Present Cargo: Minerals (kg)
24	36	Present Cargo: Gold (kg)
25	37	Present Cargo: Platinum (kg)
26	38	Present Cargo: Gem-stones (g)
27	39	Present Cargo: Aliens (tons)
28	40	ECM fitted (Y/N)
29	41	Fuel Scoop fitted (Y/N)
2A	42	Energy Bomb fitted (Y/N)
2B	43	Strength Of Energy Unit
2C	44	Docking Comps fitted (Y/N)
2D	45	Galactic H'drive fitted (Y/N)
2E	46	Escape Pod fitted (Y/N)
2F	47	?
30	48	?
31	49	?
32	50	?
33	51	Number of Missiles Fitted
34	52	Legal status (0 = clean)
35	53	Space Station's goods: Food
36	54	Space Station's goods: Textiles
37	55	Space Station's goods: Radioactives
38	56	Space Station's goods: Slaves
39	57	Space Station's goods: Liquor
3A	58	Space Station's goods: Luxuries
3B	59	Space Station's goods: Narcotics
3C	60	Space Station's goods: Computers
3D	61	Space Station's goods: Machinery
3E	62	Space Station's goods: Alloys
3F	63	Space Station's goods: Firearms
40	64	Space Station's goods: Furs
41	65	Space Station's goods: Minerals (kg)
42	66	Space Station's goods: Gold (kg)
43	67	Space Station's goods: Platinum (kg)
44	68	Space Station's goods: Gem-stones (g)
45	69	Space Station's Aliens (Ignored)
46	70	Space Station's 'random price' control
47	71	Current Score (lsb)
48	72	Current Score (msb)
49	73	??? (Halves on each Save, starts at 80)
4A	74	Special key checked by *Elite*
4B	75	Special key checked by *Elite*

Table 1. A list of the bytes in an *Elite* Commander file

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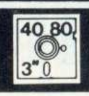
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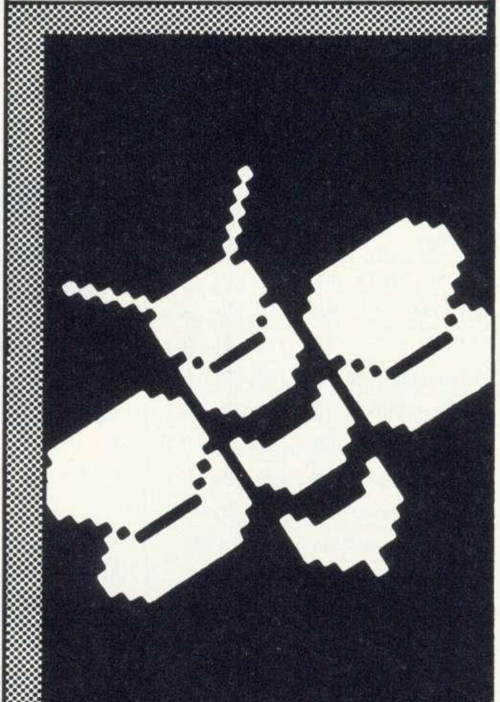


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ACORN USER Dec 84
Ask for our data sheet if you need to know more.

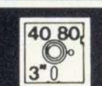


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Future modules will be STATEMENT and ACCOUNTS RECEIVABLE, STOCK CONTROL, ACCOUNTS PAYABLE and NOMINAL LEDGER.
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This program was written for our own use and is used to prepare hundreds of invoices per week. We have made life as easy as possible for ourselves, so why not take advantage of our efforts.
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ACORN USER OFFER

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Stay ahead with the latest development in computers and education with the Bar Code Teaching Pack, produced by the Microelectronics Education Programme (MEP) and Addison-Wesley, available direct to readers of *Acorn User*. (See our review in December 1984, page 65.)

The pack includes:

- bar code reader
- explanatory booklet written by *Acorn User* author George Hill
- software to print bar codes
- music program by Joe Telford
- bar code stencil
- disc or cassette of utility software

Note to disc users: the disc supplied is 40 track – however, if you order the cassette, there are instructions on how to transfer the software to 40 or 80 track discs. All for £60.84 inc VAT and £2.95 postage (£52.90 exc VAT). Stock remaining at this MEP subsidised price is limited†.

Bar code booklets

All the major listings for this issue, as printed on the yellow pages, are reproduced in bar code format in our booklet. Send a cheque or postal order for £1.60 plus an A4-sized sae to Bar Code Listings at the address below.

The following back issues of bar code listings booklets are also available at £1.60 plus an sae: December 1984; January, February, May, June, July, August, September, October, November and December 1985.

Please send me:.................... Bar Code Reader Teaching Packs* at £60.84† each inclusive

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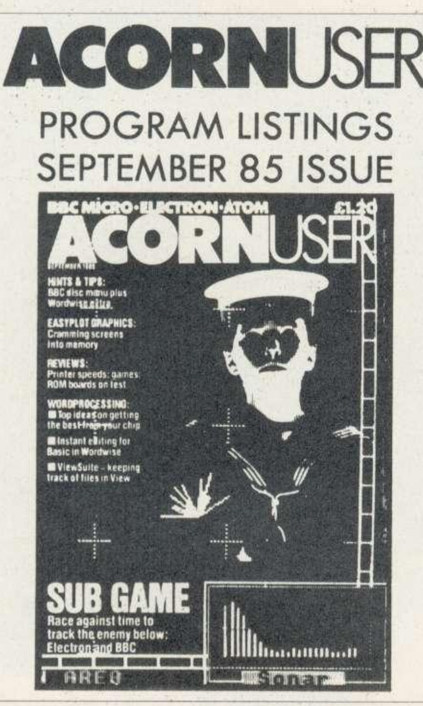
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Z80 SYSTEM
Lowdown on the MemoPlan software
EDUCATION
Practical guide to networks in schools
COMPUTER GRAPHICS
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Decorative patterns
Art software

Subscribe to the *Acorn User* monthly program listings on cassette, and we will send you both of our special cassettes, worth £3.95 each (see page 101 for details).

These are the entertaining and ever popular graphics cassette and the indispensable selection of programs from the magazine contained in the *Best of Acorn User*.

Don't wait, subscribe now, while our offer lasts. Remember our cassettes are suitable for use with the Electron and the BBC micro.

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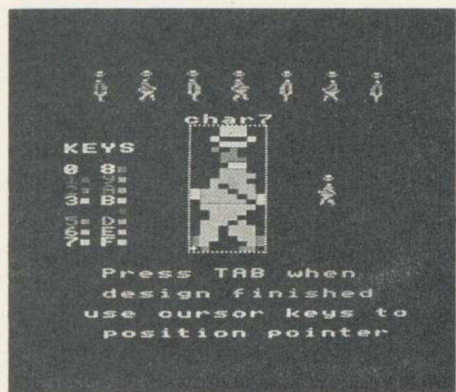
HA2

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ACORN USER GRAPHICS CASSETTE



The Graphics Cassette's sprite designer

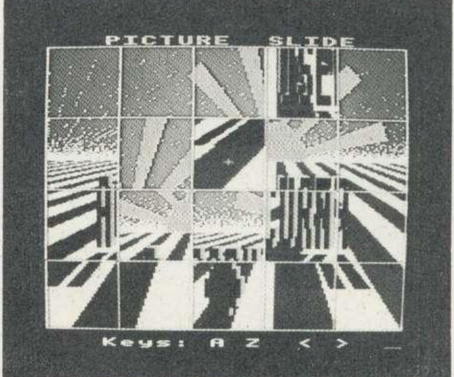
Four of the most popular and useful graphics programs that we've presented in *Acorn User* – Rob Fenton's *Paintbox*, Peter Sandford's *Colfill* and *Dotfill* and Harry Sinclair's Sprite designer – are now available on one cassette, suitable for use with the BBC micro or Electron, competitively priced at £3.95.

Paintbox, (February 1985), offers you a wide palette of facilities – airbrushing, drawing circles and squares, colour filling, colour mixing and textured effects – and it's fast!

Peter Sandford's *Dotfill* and *Colfill* (January and February 1985) allow you to produce bar charts, pie charts, maps, etc, with up to 28 coloured fill patterns and 24 tone patterns, and to mix foreground and background colours.

Harry Sinclair's Sprite designer from the September, October and November 1984 issues of *Acorn User* lets you design full-colour cartoon figures quickly, then edit, clone or mirror them and move them around the screen.

BEST OF ACORN USER CASSETTE



Picture Slide from the Best of Acorn User

The second cassette to be introduced in our developing range of special cassettes, *The Best of Acorn User*, contains a comprehensive selection of 11 program listings from past issues, which you will find entertaining and useful.

It features Malcolm Banthorpe's Turtle Graphics program, an easy introduction to Logo; an all screen mode printer dump for Epson and Epson-compatible printers; a bad program recovery routine for those times when it seems all is lost; a selection of sideways RAM utilities to help you make the most of your discs and ROMs, and two games to keep you amused, *Picture Slide* and *Quadline*.

Also included are a 40/80 track disc formatter, a tape to disc transfer routine, a disc menu and a painting program.

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HA9

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ACORN USER OFFER

A printer control ROM for £19.95





The wide variety of commands available on UserDump allow you to dump all sorts of screens without fuss

UserDUMP includes a ROM chip which plugs into any free ROM socket on your BBC micro, and an easy-to-use manual. With *UserDUMP* you'll have access to a wide range of commands to help you control your printer's facilities – all of this for just £19.95!

You will be able to dump any screen image in any display mode by entering a single command – either as a line of your program or typed in direct from the keyboard. *UserDUMP* will also give you a perfect dump while a machine code program is running.

UserDUMP will work with all the popular dot-matrix printers including: Epson MX, RX, FX, JX; Star Gemini, Delta, SG, SD, SR; Canon NLQ; Kaga NLQ: Mannesmann-Tally Spirit 80 and Lucas 80.

And also all printers with single and double-density bit-image graphics, including CP80 and JX80 colour printer.

UserDUMP provides all these extra commands:

***SDUMP**	dumps the whole screen in any mode
***WDUMP**	dumps the graphics window
***CDUMP**	very fast screen dump using the computer's character definitions
***ZDUMP**	special distortion-free dump of a mode 0 screen for selected printers
***TDUMP**	dumps the text window in any mode
***JDUMP**	colour dump for the JX80 printer
***WINDOW**	defines a graphics window from the keyboard
***C@**	sets up CTRL @ option
***TRANSTT**	converts a teletext screen into mode 1
***RTT**	restores a teletext screen after *TRANSTT
***LPRINT**	directs all PRINT commands to the printer only
***LPOFF**	cancels*LPRINT
***SET**	sets the printer text style
***RESET**	turns off the effect of *SET
***MAR**	sets either printer margin
***SHIFT**	shifts an area of memory
***CP80**	selects a CP80-type printer
***IBM**	selects an IBM-style printer
***EPSON**	cancels *CP80 or *IBM and selects Epson-style printer

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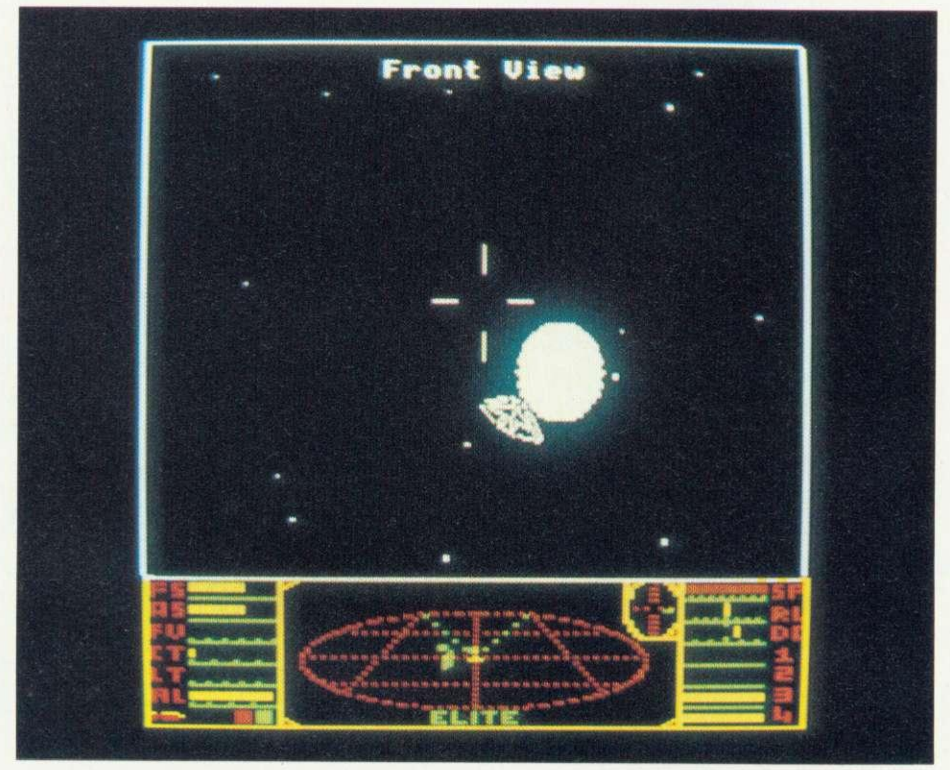
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ACORN USER OFFER

February listings on cassette £3.75 or disc £5.75



This month's program listings cassette features a utility for adding extra commands to Basic, a memory-saving screen-shrinker and an *Elite* Commander file editor.

There is also a disc version of the February program listings available at £5.75 which, in addition, includes the January front cover. Plus we can still supply the October, November, December and January discs.

If you would like a cassette of our program listings from back issues, these are available from May 1984. Send all orders to Acorn User Products, PHS Mailing Ltd, PO Box 14, Horley, Surrey RH6 8DW.

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BACK ISSUES

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1982 September, October, November and December
1983 January, July, September, October, November and December
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1985 January, March, April, May, June, July, August, September, October, November and December
1986 January
If you need further details about the contents of these issues send an sae to Back Issues, Diane Wiltshire, Acorn User, 68 Long Acre, London WC2E 9JH.

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YELLOW PAGES

HINTS & TIPS

INDEX PROGRAM		Page	BBC B	BBC B+/128K	6502SP	Electron	Econet	ADFS	Monthly cassette & disc
Hints & Tips	Listing 1	105	●	●	●	●	●	●	●
	Listing 2-3	106	●	●			●	●	●
Joe's Jottings	Listing 1	107	●	●		●	●	●	●
	Listing 2-3	108	●	●		●	●	●	●(a)
	Listing 4-8	108-111		●			●	●	●
Shrinking Screens	Listing 1	111	●	●			●	●	●(a)
	Listing 2	112	●	●	●		●	●	●
Extending Basic	Listing 1-2	112-113	●	●		●	●	●	●
Sideways RAM Example	Listing 1-3	114-116	●	●		●	●	●	●
Elite Editor	Listing 1	116	●	●	●	●		●	●
Joystick Utilities	Listing 1-3	120	●	●	●	●	●	●	●

Note: (a) If you have a model B+ or B+128k ensure that shadow RAM is switched off (by typing *SHADOW 1 <Return>) before using the program.

Hints & Tips, see page 49

Enter listings

Where possible, programs are listed with line numbers in increments of 10. With these listings, simply type AUTO <RETURN> before you begin. This will give automatic line numbering. Don't type a space after the line number. To list your program so it appears identical to the printed version in the magazine, type: LISTO 1 <RETURN> WIDTH 40 <RETURN> LIST <RETURN>

With screen modes 1,4,6 or 7, WIDTH 40 is not needed. Note that occasionally, for clarity, programs are listed with a text width different to our standard of 40 characters.

Most typing mistakes in Basic will cause error messages when the program is run. Finding errors in assembly language listings is often harder, so we provide checksums where we can.

Checksums are small routines which report any mistakes in assembled machine-code. In the August issue of *Acorn User* we published a program for calculating checksums for Basic programs.

Listing 1. Displays each foreground and background colour combination

```
   10 REM Hints & Tips - Listing 1
   20 REM Colour contrast tester
   30 REM by Martin Phillips
   40 REM BBC B/B+/128k and Electron
   50 REM (c) Acorn User February 1986
   60 :
   70 MODE 1
   80 PROCinitialise
   90 PROCtest
  100 PROCresult
  110 END
  120 :
  130 DEF PROCinitialise
  140 DIM result(7,7),colour$(7)
  150 FOR C%=0 TO 7
  160 READ colour$(C%)
  170 NEXT C%
  180 DATA black,red,green,yellow
  190 DATA blue,magenta,cyan,white
  200 ENDPROC
  210 :
  220 DEF PROCtest
  230 FOR I%=0 TO 7
  240 VDU 19,1,I%,0,0,0
  250 FOR J%=0 TO 7
  260 IF J%=I% THEN re=0:GOTO 410
  270 VDU 19,2,J%,0,0,0
  280 VDU 28,0,4,39,0
  290 COLOUR 129:CLS
  300 COLOUR 2
  310 PRINT TAB(8,2)"Colour Contrast Tes
ter"
  320 VDU 26
  330 COLOUR 128
  340 COLOUR 3
  350 PRINT TAB(8,10)"Background colour
is "colour$(I%)"     "
  360 PRINT TAB(8,11)"Foreground colour
is "colour$(J%)"     "
  370 PRINT TAB(8,15)"Enter legibility l
evel"
```

Continued ▶

◀ Continued

```
  380 PRINT TAB(8,17)"1 bad, 2 OK, 3 goo
d ";
  390 REPEAT
  400 re=GET-48:UNTIL re>0 AND re<4
  410 result(I%,J%)=re
  420 NEXT J%
  430 NEXT I%
  440 ENDPROC
  450 :
  460 DEF PROCresult
  470 CLS
  480 PRINT"Printer on (Y/N) ";
  490 REPEAT A$=GET$
  500 UNTIL A$="Y" OR A$="N"
  510 IF A$="N" THEN CLS:GOTO570
  520 INPUT''"Enter name "name$
  530 INPUT'"Enter VDU type "vdu$
  540 VDU 12,2
  550 PRINT"Name: "name$
  560 PRINT"Monitor type: "vdu$
  570 PRINT'''"THE FOLLOWING ARE EASY TO
 READ";
  580 PROCprint(3)
  590 PRINT'''"THE FOLLOWING ARE SATISFA
CTORY TO READ";
  600 PROCprint(2)
  610 PRINT'''"THE FOLLOWING ARE DIFFICU
LT TO READ";
  620 PROCprint(1)
  630 VDU 12,3
  640 ENDPROC
  650 :
  660 DEF PROCprint(p)
  670 FOR I%=0 TO 7
  680 PRINT'colour$(I%)" background: ";
  690 FOR J%=0 TO 7
  700 IF result(I%,J%)<>p THEN GOTO 720
  710 PRINT colour$(J%)" ";
  720 NEXT J%,I%
  730 IF A$="Y" THEN ENDPROC
  740 PRINT TAB(0,30)"Press space to con
tinue";
  750 REPEAT:UNTIL GET=32
  760 CLS
  770 ENDPROC
```

Listing 2. Prints out all ROM titles

```
   10 REM Hints & Tips - Listing 2
   20 REM ROM look
   30 REM by Martin Phillips
   40 REM BBC B/B+/128k
   50 REM (c) Acorn User February 1986
   60 :
   70 MODE 7:@%=3
   80 VDU 23;8202;0;0;0;
   90 PRINT TAB(14,1)CHR$(141)CHR$(134)"
ROM LOOK"
  100 PRINT TAB(14,2)CHR$(141)CHR$(134)"
ROM LOOK"'
  110 PRINTCHR$(131)"position";
  120 PRINTCHR$(130)"        ROM"
  130 PRINTCHR$(150)STRING$(38,CHR$(172)
)
  140 FOR Y%=0 TO 15
  150 IF FNromlook(0)=&80 THEN GOTO230
  160 PRINTCHR$(131)Y%;
  170 N%=9:title$=""
  180 REPEAT:val=FNromlook(N%)
  190 N%=N%+1
  200 IF val>31 AND val<127 THEN title$=
title$+CHR$(val)
  210 UNTIL val=0
  220 PROCprint
  230 NEXT Y%
  240 END
  250 :
  260 DEF FNromlook(N)
  270 ?&F6=N:?&F7=&80
  280 =USR(&FFB9) AND &FF
  290 :
  300 DEF PROCprint
  310 PRINTCHR$(130);
  320 IF LEN(title$)<34 THEN PRINTTAB(6)
title$:ENDPROC
  330 in=INSTR(title$," ",24)
  340 PRINT TAB(6)LEFT$(title$,in)
  350 PRINT TAB(5)CHR$(130);MID$(title$,
in+1)
  360 ENDPROC
```

Listing 3. Enables up to 10 pages of help information to be created quickly

```
   10 REM Hints & Tips - Listing 3
   20 REM Help page creator
   30 REM by Martin Phillips
   40 REM BBC B/B+/128k
   50 REM (c) Acorn User February 1986
   60 :
   70 PROCsetup
   80 REPEAT
   90 PROCrun
  100 UNTIL a=128
  110 PROCsave
  120 END
  130  :
  140 DEF PROCsetup
  150 *KEY10 OLD|MRUN|M
  160 REM use *KEY10 OLD|M |N LIST|M
  170 REM until program is debugged
  180 *FX 4,2
  190 I%=0:page%=0:char=255
```

Continued ►

◄ Continued

```
  200 VDU 12
  210 PRINT TAB(5,10)"Please wait";
  220 DIM M% 9999
  230 FOR N%=0 TO 9999 STEP4
  240 N%!M%=&20202020:NEXT
  250 page$=STRING$(6," ")+"Press SHIFT
for more"+STRING$(5," ")
  260 end$=STRING$(6," ")+"Press SHIFT t
o finish"+STRING$(4," ")
  270 *KEY0 |!|M
  280 *KEY1 |!|L
  290 *KEY2 |!|Y
  300 *KEY3 |!|Z
  310 *KEY4 |!|\
  320 *KEY5 |!|}
  330 *KEY6 |!|~
  340 *KEY7 |!|`
  350 *KEY8 |B
  360 *KEY9 |F
  370 *KEY11 |G
  380 *KEY12 |H
  390 *KEY13 |I
  400 *KEY14 |J
  410 *KEY15 |K
  420 CLS
  430 PRINT"Load an old file? ";
  440 REPEAT:A$=GET$
  450 UNTIL A$="Y" OR A$="N"
  460 IF A$="Y" THEN PROCload:ELSE CLS
  470 ENDPROC
  480 :
  490 DEF PROCrun
  500 double=0:VDU26
  510 PRINTTAB(0,24)CHR$(134)"Page ";I%+
1;
  520 IF I%<9 THEN PRINTpage$;:ELSE PRIN
Tend$;
  530 VDU 28,0,23,39,0
  540 REPEAT
  550 a=GET
  560 IF a=7 THEN a=char
  570 IF a=136 THEN a=8
  580 IF a=137 THEN a=9
  590 IF a=138 THEN a=10
  600 IF a=139 THEN a=11
  610 IF a=128 THEN GOTO 780
  620 IF a=2 THEN PROCbackward:GOTO780
  630 IF a=6 THEN PROCforward:GOTO780
  640 IF a=13 AND VPOS=23 THEN GOTO550
  650 IF a=13 THEN VDU10
  660 IF a=141 AND VPOS<23 THEN double=1
:VDU10
  670 IF a=127 AND POS=0 AND VPOS=0 THEN
 GOTO 550
  680 IF a=144 THEN PROCchar:GOTO550
  690 IF a=8 AND POS=0 THEN GOTO550
  700 IF a=9 AND POS=39 THEN GOTO550
  710 IF a=10 AND VPOS=23 THEN GOTO550
  720 IF a=11 AND VPOS=0 THEN GOTO550
  730 IF VPOS=23 AND POS=39 AND a>11 THE
N GOTO550
  740 VDU a
  750 IF a=10 OR a=11 OR a=13 THEN PROCd
ouble:GOTO780
  760 IF double=1 AND a<>127 AND a<>8 TH
EN VDU11,8,a,10
  770 IF double=1 AND a=127 THEN VDU11,9
,a,10
  780 UNTIL a=128 OR a=2 OR a=6
```

Continued ►

Joe's Jottings, see page 74

Listing 3 continued

```
 790 IF a=128 PROCstore:I%=I%+1:IF I%>p
age% THEN page%=I%
 800 ENDPROC
 810 :
 820 DEF PROCsave
 830 CLS
 840 INPUT"Enter title "title$
 850 A$=CHR$(134)+"Page "+STR$(page%)+e
nd$
 860 $(M%-40+(1000*page%))=A$
 870 FOR N%=996TO 9996 STEP1000
 880 N%!M%=&000C0D0D:NEXT
 890 X=OPENOUT(title$)
 900 FOR N%=0 TO 1000*page%
 910 BPUT#X,M%?N%
 920 NEXT N%
 930 CLOSE#0
 940 ENDPROC
 950 :
 960 DEF PROCforward
 970 *FX 21,0
 980 PROCstore
 990 I%=I%+1:IF I%>9 THEN I%=0
1000 IF I%>page% THEN page%=I%
1010 IF M%?(&3C0+1000*I%)=&86 THEN PROC
retrieve:ELSE CLS
1020 ENDPROC
1030 :
1040 DEF PROCbackward
1050 *FX 21,0
1060 PROCstore
1070 I%=I%-1:IF I%<0 THEN I%=page%
1080 IF M%?(&3C0+1000*I%)=&86 THEN PROC
retrieve:ELSE CLS
1090 ENDPROC
1100 :
1110 DEF PROCstore
1120 FOR N%=0 TO 999 STEP4
1130 M%!(N%+1000*I%)=N%!&7C00
1140 NEXT N%
1150 ENDPROC
1160 :
1170 DEF PROCretrieve
1180 FOR N%=0 TO 999 STEP4
1190 N%!&7C00=M%!(N%+1000*I%)
1200 NEXT N%
1210 ENDPROC
1220 :
1230 DEF PROCdouble
1240 double=0
1250 J%=40*VPOS:REPEAT
1260 IF J%?&7C00=141 THEN double=1:IF J
%?&7C28=141 THEN VDU a
1270 IF J%?&7C00=140 THEN double=0
1280 J%=J%+1
1290 UNTIL J%>(40*VPOS+POS) OR double=1
1300 ENDPROC
1310 :
1320 DEF PROCload
1330 INPUT''"Enter title "title$
1340 X=OPENIN(title$)
1350 FOR N%=0 TO EXT#X
1360 M%?N%=BGET#X
1370 NEXT
1380 CLOSE #X
1390 page%=N%/1000
1400 VDU 26,12
1410 PROCretrieve
1420 ENDPROC
```

Continued ▶

◀ Continued

```
1430 :
1440 DEF PROCchar
1450 J%=0:REPEAT
1460 val=J%?(VPOS*40+&7C00):J%=J%+1
1470 UNTIL val>144 AND val<152 OR J%>PO
S
1480 IF J%>POS THEN VDU151
1490 char=0
1500 REPEAT
1510 a=GET AND 95
1520 IF a=81 THEN char=char+1-2*(1 AND
char)
1530 IF a=87 THEN char=char+2-2*(2 AND
char)
1540 IF a=65 THEN char=char+4-2*(4 AND
char)
1550 IF a=83 THEN char=char+8-2*(8 AND
char)
1560 IF a=90 THEN char=char+16-2*(16 AN
D char)
1570 IF a=88 THEN char=char+64-2*(64 AN
D char)
1580 VDU (160+char),8
1590 UNTIL a=13
1600 char=char+160
1610 ENDPROC
```

How to enter Error Spotting

To help you spot typing errors when entering the assembly language in listings 4 to 7, checksum routines have been included at the end of these programs. If you have made a mistake then a message will be displayed, prompting you to check your listing. If the listing has been entered correctly, the checksum will confirm this and you can then save the assembled code in the way described on page 74.

Listing 1. Checks presence of specific ROM chips

```
 10 REM Listing 1 - ROM check
 20 REM by Joe Telford
 30 REM BBC B/B+/128k and Electron
 40 REM (c) Acorn User February 1986
 50 :
 60 name$="POO                    "
 70 IF NOT FNchip(name$) PRINTname$ "
chip not installed":END
 80 PRINT"Confirmed, "name$" in socket
 ";Y%
 90 REM rest of program...
100 :
110 END
120 :
130 DEF FNchip(n$)
140 LOCAL counter,target,char,title$
150 target=FALSE
160 FOR counter=15 TO 0 STEP -1
170 title$=""
180 Y%=counter:?&F7=&80:?&F6=&08
190 REPEAT:?&F6=?&F6+1
200 char=(USR(&FFB9) AND &FF)
210 IF char>0 title$=title$+CHR$(char)
```

Continued ▶

JOE'S JOTTINGS

Joe's listing 1 continued

```
220 UNTIL char=0 OR LENtitle$=LENn$
230 PRINT title$
240 IF title$=n$ THEN counter=0:target
=TRUE
250 NEXT
260 =target
```

Listing 2. Codes the information already on disc

```
10 REM Listing 2 - Screen Packer 1.0
20 REM by Joe Telford
30 REM BBC B/B+/128k and Electron
40 REM (c) Acorn User February 1986
50 :
60 S%=&2FFF:C%=OPENOUT"S.PACK"
70 REPEAT
80 S%=S%+1:B%=?S%:N%=0
90 REPEAT
100 N%=N%+1
110 UNTIL ?(S%+N%)<>B% OR N%=255
120 S%=S%+N%-1
130 BPUT#C%,B%:BPUT#C%,N%
140 UNTIL S%>=&8000
150 CLOSE#0
160 END
```

Listing 3. Reverses the PACK procedure

```
10 REM Listing 3 - Screen Unpacker
20 REM by Joe Telford
30 REM BBC B/B+/128k and Electron
40 REM (c) Acorn User February 1986
50 :
60 S%=&2FFF:C%=OPENIN"S.PACK"
70 REPEAT
80 B%=BGET#C%:N%=BGET#C%
90 REPEAT
100 S%=S%+1:?S%=B%:N%=N%-1
110 UNTIL N%=0
120 UNTIL EOF#C%
130 CLOSE#0
140 END
```

Listing 4. PACK command for the B+

```
10 REM Listing 4 - *PACK
20 REM by Joe Telford
30 REM BBC B+/128k only
40 REM (c) Acorn User February 1986
50 :
60 start=&900
70 starstarthi=&F3:starstartlo=&F2
80 ptrlochi=&F7:ptrloclow=&F6
90 bloc=&70:nloc=&71:handle=&72
100 osfind=&FFCE:osbput=&FFD4
110 osrdsc=&FFB9
```

Continued ▶

◀ Continued

```
120 openout=&80
130 FOR pass=0 TO 3 STEP 3
140 P%=start
150 [OPT pass
160 \Add Y to star parameter pointers
170 TYA
180 CLC
190 ADC starstartlo
200 STA starstartlo
210 LDA #0
220 ADC starstarthi
230 \Now set up Y reg with hi val...
240 TAY
250 \...and  X reg with low val
260 LDX starstartlo
270 \Open file for output
280 LDA #openout
290 JSR osfind
300 BNE setup
310 BRK
320 OPT FNequb(51,pass)
330 OPT FNequs("Can't write Pack file"
,pass) \ Error message
340 BRK
350 .setup
360 STA handle
370 \Set pointer to start of screen
380 LDA #&FF
390 STA ptrloclow
400 LDA #&2F
410 STA ptrlochi
420 .mainloop
430 CLC
440 JSR increment
450 STA bloc
460 LDA ptrlochi
470 \End of screen?
480 CMP #&80
490 BEQ exit
500 LDA #0
510 STA nloc
520 \nloc is byte counter
530 .counter
540 INC nloc
550 JSR increment
560 \Is next block same as last?
570 CMP bloc
580 BNE endcount
590 LDA nloc
600 \Have we got 255 repeated bytes?
610 CMP #&FF
620 BNE counter
630 .endcount
640 DEC ptrloclow
650 LDA ptrloclow
660 CMP #&FF
670 BNE on
680 DEC ptrlochi
690 .on
700 LDA bloc
710 LDY handle
720 \Write repeated byte to file
730 JSR osbput
740 LDA nloc
750 \Write count to file
760 JSR osbput
770 JMP mainloop
780 .exit
```

Continued ▶

Listing 4 continued

```
 790 LDY handle
 800 LDA #0
 810 \Close file
 820 JSR osfind
 830 RTS
 840 .increment
 850 INC ptrloclow
 860 BNE over
 870 INC ptrlochi
 880 .over
 890 LDY #0
 900 JSR osrdsc
 910 RTS
 920 ]NEXT
 930 :
 940 REM Checksum
 950 total%=0
 960 FOR byte%=start TO P%-1
 970 total%=total%+?byte%:NEXT
 980 IF total%<>17520 PRINT"Checksum er
ror - please check listing":END
 990 PRINT "*PACK ready to save"
1000 END
1010 DEF FNequb(byte,opt)
1020 ?P%=byte
1030 P%=P%+1
1040 =opt
1050 DEF FNequs(string$,opt)
1060 $P%=string$
1070 P%=P%+LEN(string$)
1080 =opt
```

Listing 5. *UNPACK command for the B+

```
 10 REM Listing 5 - *UNPACK
 20 REM by Joe Telford
 30 REM BBC B+/128k only
 40 REM (c) Acorn User February 1986
 50 :
 60 start=&900
 70 starstarthi=&F3:starstartlo=&F2
 80 ptrlochi=&D7:ptrloclow=&D6
 90 bloc=&70:nloc=&71:handle=&72
100 osfind=&FFCE:osbget=&FFD7
110 oswrsc=&FFB3
120 openin=&40
130 FOR pass=0 TO 3 STEP 3
140 P%=start
150 [OPT pass
160 \Add y to star parameter pointers
170 TYA
180 CLC
190 ADC starstartlo
200 STA starstartlo
210 LDA #0
220 ADC starstarthi
230 \Now set up Y reg with hi val...
240 TAY
250 \...and X reg with low val
260 LDX starstartlo
270 \Open file for input
280 LDA #openin
290 JSR osfind
300 BNE setup
```

Continued ▶

◀ Continued

```
310 BRK
320 OPT FNequb(50,pass)
330 OPT FNequs("Can't find Pack file",
pass)  \ Error message
340 BRK
350 .setup
360 STA handle
370 \Set pointer to start of screen
380 LDA #&FF
390 STA ptrloclow
400 LDA #&2F
410 STA ptrlochi
420 .getchars
430 CLC
440 LDY handle
450 \Get repeated byte
460 JSR osbget
470 STA bloc
480 BCS exit
490 LDY handle
500 \Get no. of times byte repeated
510 JSR osbget
520 STA nloc
530 BCS exit
540 .loop
550 INC ptrloclow
560 BNE over
570 INC ptrlochi
580 .over
590 LDY #0
600 LDA bloc
610 JSR oswrsc
620 DEC nloc
630 BNE loop
640 BEQ getchars
650 .exit
660 \Close file
670 LDY handle
680 LDA #0
690 JSR osfind
700 RTS
710 ]NEXT
720 :
730 REM Checksum
740 total%=0
750 FOR byte%=start TO P%-1
760 total%=total%+?byte%:NEXT
770 IF total%<>13041 PRINT"Checksum er
ror - please check listing":END
780 PRINT "*UNPACK ready to save"
790 END
800 DEF FNequb(byte,opt)
810 ?P%=byte
820 P%=P%+1
830 =opt
840 DEF FNequs(string$,opt)
850 $P%=string$
860 P%=P%+LEN(string$)
870 =opt
```

All the major listings for this issue, as printed on the yellow pages, are reproduced in bar code format in our booklet. Turn to page 99 for details of how to obtain your copy.
The Bar Code Teaching Pack, produced by the Micro-electronics Education Programme (MEP) and Addison-Wesley, is available direct to readers of AU. *The pack includes: bar code reader, explanatory booklet; software to print bar codes; music program by Joe Telford; bar code stencil and disc or cassette of utility software.*

Listing 6. Shadow version of *SAVE

```
   10 REM Listing 6 - *SSAVE
   20 REM by Joe Telford
   30 REM BBC B+/128k only
   40 REM (c) Acorn User February 1986
   50 :
   60 start=&900
   70 starstarthi=&F3:starstartlo=&F2
   80 ptrlochi=&F7:ptrloclow=&F6
   90 bloc=&70:handle=&72
  100 osfind=&FFCE:osbput=&FFD4
  110 osrdsc=&FFB9
  120 openout=&80
  130 FOR pass=0 TO 3 STEP 3
  140 P%=start
  150 [OPT pass
  160 \Add Y to star parameter pointers
  170 TYA
  180 CLC
  190 ADC starstartlo
  200 STA starstartlo
  210 LDA #0
  220 ADC starstarthi
  230 \Now set up Y reg with hi val...
  240 TAY
  250 \...and X reg with low val
  260 LDX starstartlo
  270 LDA #openout
  280 \Open file for output
  290 JSR osfind
  300 BNE setup
  310 BRK
  320 OPT FNequb(52,pass)
  330 OPT FNequs("Can't open Screen file
 ",pass) \ Error message
  340 BRK
  350 .setup
  360 STA handle
  370 \Set pointer to start of screen
  380 LDA #&FF
  390 STA ptrloclow
  400 LDA #&2F
  410 STA ptrlochi
  420 .mainloop
  430 CLC
  440 INC ptrloclow
  450 BNE over
  460 INC ptrlochi
  470 .over
  480 LDA ptrlochi
  490 \End of screen?
  500 CMP #&80
  510 BEQ exit
  520 LDY #0
  530 \Read byte from screen into A
  540 JSR osrdsc
  550 LDY handle
  560 \Write byte to file
  570 JSR osbput
  580 JMP mainloop
  590 .exit
  600 LDY handle
  610 LDA #0
  620 \Close file
  630 JSR osfind
  640 RTS
  650 ]NEXT
  660 :
  670 REM Checksum
  680 total%=0
```

Continued ▶

◀ Continued

```
  690 FOR byte%=start TO P%-1
  700 total%=total%+?byte%:NEXT
  710 IF total%<>11453 PRINT"Checksum er
ror - please check listing":END
  720 PRINT"*SSAVE ready to save"
  730 END
  740 DEF FNequb(byte,opt)
  750 ?P%=byte
  760 P%=P%+1
  770 =opt
  780 DEF FNequs(string$,opt)
  790 $P%=string$
  800 P%=P%+LEN(string$)
  810 =opt
```

Listing 7. Shadow version of *LOAD

```
   10 REM Listing 7 - *SLOAD
   20 REM by Joe Telford
   30 REM BBC B+/128k only
   40 REM (c) Acorn User February 1986
   50 :
   60 start=&900
   70 starstarthi=&F3:starstartlo=&F2
   80 ptrlochi=&D7:ptrloclow=&D6
   90 bloc=&70:handle=&72
  100 osfind=&FFCE:osbget=&FFD7
  110 oswrsc=&FFB3
  120 openin=&40
  130 FOR pass=0 TO 3 STEP 3
  140 P%=start
  150 [OPT pass
  160 \Add y to star parameter pointers
  170 TYA
  180 CLC
  190 ADC starstartlo
  200 STA starstartlo
  210 LDA #0
  220 ADC starstarthi
  230 \Now set up Y reg with hi val...
  240 TAY
  250 \...and X reg with low val
  260 LDX starstartlo
  270 LDA #openin
  280 \Open file for input
  290 JSR osfind
  300 BNE setup
  310 BRK
  320 OPT FNequb(50,pass)
  330 OPT FNequs("Can't find Screen file
 ",pass) \ Error message
  340 BRK
  350 .setup
  360 STA handle
  370 \Set pointer to start of screen
  380 LDA #&FF
  390 STA ptrloclow
  400 LDA #&2F
  410 STA ptrlochi
  420 .getchar
  430 CLC
  440 LDY handle
  450 \Get byte from file
  460 JSR osbget
  470 BCS exit
```

Continued ▶

Listing 7 continued

```
480 INC ptrloclow
490 BNE over
500 INC ptrlochi
510 .over
520 LDY #0
530 \Write byte in A to screen
540 JSR oswrsc
550 JMP getchar
560 .exit
570 LDY handle
580 LDA #0
590 \Close file
600 JSR osfind
610 RTS
620 ]NEXT
630 :
640 REM Checksum
650 total%=0
660 FOR byte%=start TO P%-1
670 total%=total%+?byte%:NEXT
680 IF total%<>10435 PRINT"Checksum er
ror - please check listing":END
690 PRINT"*SLOAD ready to save"
700 END
710 DEF FNequb(byte,opt)
720 ?P%=byte
730 P%=P%+1
740 =opt
750 DEF FNequs(string$,opt)
760 $P%=string$
770 P%=P%+LEN(string$)
780 =opt
```

Listing 8. Tests listings 1-7

```
10 REM Listing 8 - B+ utils test
20 REM by Joe Telford
30 REM BBC B+/128k only
40 REM (c) Acorn User Febraury 1986
50 :
60 MODE 1:*SHADOW
70 VDU 24,0;256;1279;1023;
80 FOR x%=0 TO 100
90 VDU 29,0;256;
100 GCOL 0,RND(4)-1
110 PROCrect(RND(1279),RND(767),RND(40
0),RND(250))
120 NEXT
130 GCOL 0,3
140 MOVE 0,0
150 DRAW 1279,0:DRAW 1279,767
160 DRAW 0,767:DRAW 0,0
170 PRINT TAB(4,24);"BBC B+ SHADOW SCR
EEN FROM TUBE"
180 PRINT TAB(16,26);"SAVE/LOAD"
190 *SSAVE U.TEST
200 PRINT TAB(15,26);"PACK/UNPACK"
210 *PACK P.TEST
220 PRINT TAB(0,28);"PRESS ANY KEY"
230 key=GET
240 CLS:PRINT"SLOADing.............."
250 *SLOAD U.TEST
260 PRINT TAB(0,28);"PRESS ANY KEY"
270 key=GET
280 CLS:PRINT"UNPACKing............."
```

Continued ▶

◀ Continued

```
290 *UNPACK P.TEST
300 END
310 DEF PROCrect(x,y,l,w)
320 MOVE x,y
330 DRAW x+l,y
340 PLOT 85,x,y+w
350 PLOT 85,x+l,y+w
360 ENDPROC
```

Shrinking Screens, see page 80

Listing 1. Robert O'Leary's program to set up a screen of reduced size. NB: this listing dumped with WIDTH = 41

```
10 REM Shrinking Screens - Listing 1
20 REM by Robert O'Leary
30 REM BBC B/B+/128k
40 REM (c) Acorn User February 1986
50 :
60 REM New screen start address:-
70 start%=&4400
80 :
90 REM Main loop:-
100 REPEAT
110 MODE 1
120 :
130 REM R10=32 (turn off cursor)
140 VDU 23,0,10,32,0,0,0,0,0,0
150 :
160 PROCshowmemory
170 PROCspace
180 PROCsmallscreen
190 PROCspace
200 PROCchangeaddress(start%)
210 PROCspace
220 PROChidememory
230 PROCspace
240 PROCcentralise
250 PROCspace
260 PROCinfo
270 PROCspace
280 UNTIL FALSE
290 :
300 DEF PROCshowmemory
310 FOR s%=&3000 TO start%-1 STEP4
320 !s%=&00C0C0C0
330 NEXT
340 PRINT TAB(11,1)SPC(18)
350 PRINT TAB(11,2)" Memory available "
360 PRINT TAB(11,3)" for program use. "
370 PRINT TAB(11,4)SPC(18)
380 PRINT TAB(11,5)" (&3000 to &43FF) "
390 PRINT TAB(11,6)SPC(18)
400 ENDPROC
410 :
420 DEF PROCsmallscreen
430 VDU 28,0,31,39,8
440 COLOUR 129
450 CLS
460 FOR line%=1 TO 24
470 PRINT TAB(0,line%-1)"Line: ";line%;
480 NEXT
490 COLOUR 128
500 PRINT TAB(9,11)SPC(22)
510 PRINT TAB(9,12)" Smaller screen siz
e. "
```

Continued ▶

O'Leary listing 1 continued

```
520 PRINT TAB(9,13)SPC(22)
530 COLOUR 129
540 ENDPROC
550 :
560 DEF PROCchangeaddress(address%)
570 address%=address% DIV 8
580 ?&FE00=12:?&FE01=address% DIV 256
590 ?&FE00=13:?&FE01=address% MOD 256
600 COLOUR129
610 CLS
620 MOVE 0,1023-(8*32):DRAW512,512
630 PRINT TAB(7,8)"Screen now starts at &4400"
640 ENDPROC
650 :
660 DEF PROChidememory
670 VDU 23,0,6,24,0,0,0,0,0,0
680 MOVE 512,0
690 DRAW 512,280
700 PRINT TAB(4,14)"Register 6 changed from 32 to 24"
710 ENDPROC
720 :
730 DEF PROCcentralise
740 *FX 151,0,7
750 *FX 151,1,31
760 ENDPROC
770 :
780 DEF PROCinfo
790 CLS
800 PRINT TAB(0,10)"HIMEM may now be changed to the same"
810 PRINT"value as the start of screen memory."
820 PRINT"Thus, in this example, HIMEM=&4400 and"
830 PRINT"a program using MODE1 graphics can be"
840 PRINT"5K longer than usual."
850 ENDPROC
860 DEF PROCspace
870 REPEAT UNTIL GET=32
880 ENDPROC
```

Listing 2. Incorporates listing 1 into your own program

```
10 REM Shrinking Screens - Listing 2
20 REM by Robert O'Leary
30 REM BBC B/B+/128k
40 REM (c) Acorn User February 1986
50 :
60 MODE1
70 COLOUR 129
80 CLS
90 :
100 REM Turn off cursor:-
110 VDU 23,0,10,32,0,0,0,0,0,0
120 :
130 REM Set up text window:-
140 VDU 28,0,31,39,8
150 :
160 REM Alter start of memory:-
170 *FX 151,0,12
180 *FX 151,1,8
190 *FX 151,0,13
```

Continued ►

◄ Continued

```
200 *FX 151,1,128
210 :
220 REM Show first 24 lines:-
230 *FX 151,0,6
240 *FX 151,1,24
250 :
260 REM Centralise screen:-
270 *FX 151,0,7
280 *FX 151,1,31
290 :
300 REM CHAIN"NEXT"
```

Extending Basic, see page 83

Listing 1. Michael Ginns' program to extend Basic

```
10 REM Extending Basic - Listing 1
20 REM by Michael Ginns
30 REM BBC B/B+/128k and Electron
40 REM with Basic 1 or 2
50 REM (c) Acorn User February 1986
60 :
70 REM Set start address of utility
80 REM program
90 start=PAGE
100 code=&900
110 :
120 REM Store address of Basic's
130 REM error handler
140 error=!&202 AND &FFFF
150 :
160 FOR pass=0 TO 2 STEP 2
170 P%=code
180 [OPT pass
190 LDY #0
200 \Get error number
210 LDA (&FD),Y
220 \Is error a 'Mistake'?
230 CMP #4
240 BNE out
250 LDA &C
260 \Was command issued from the
270 \keyboard?
280 CMP #7
290 BNE out
300 \Reset Basic's error pointer
310 LDA #start MOD 256
320 STA &16
330 LDA #start DIV 256
340 STA &17
350 \Get high byte of PAGE
360 LDA &18
370 STA &8F
380 \Set high byte of PAGE to where
390 \utility program starts
400 LDA &17
410 STA &18
420 .out
430 \Jump to normal error routine
440 JMP error
450 ]
460 NEXT pass
470 REM Protect utilities from Break
480 !&8B=!&202 AND &FFFF0000 OR code
490 *KEY10|!|X|I|UO.|K|M|I|!&202=!&8B|K|M|IPA.=TOP+256|K|M|INEW|K|M|HExtended Mode|J|U|M
500 PRINT''"Basic intercepted!"
510 PRINT'''"LOAD 'LANG2' and then press Break"
520 END
```

Listing 2. 11 example extended Basic commands

```
   10 REM Extending Basic - Listing 2
   20 REM by Michael Ginns
   30 REM BBC B/B+/128k and Electron
   40 REM with Basic 1 or 2
   50 REM (c) Acorn User February 1986
   60 :
   70 ON ERROR GOTO 130
   80 IF ?&700=32 $&700=$&701:GOTO 80
   90 $&700=$&700+STRING$(&F0-LEN($&700)," ")
  100 ?&C000=EVAL("FN"+$&700)
  110 PAGE=?&8F*256
  120 END
  130 IF ERL=100 PRINT'"Mistake" ELSE REPORT:PRINT
  140 PAGE=?&8F*256
  150 END
  160 :
 1000 DEF FNMEMORY
 1010 PRINT '"Memory Left = ";
 1020 PRINT ;!6-!2 AND &FFFF;
 1030 PRINT " bytes"
 1040 =1
 1050 :
 2000 DEF FNSIZE
 2010 PRINT '"Program Size=";
 2020 PRINT ;TOP-?&8F*256;
 2030 PRINT " bytes"
 2040 =1
 2050 :
 3000 DEF FNCHAR
 3010 LOCAL A%,X%,Y%,T%
 3020 A%=EVAL($&705)
 3030 IF (A% MOD 256)<32 PRINT "Control Character":GOTO 3100
 3040 ?&700=A%:A%=10:Y%=7
 3050 CALL &FFF1
 3060 PRINT "VDU 23,";?&700;
 3070 FOR T%=1 TO 8
 3080 PRINT ;",";T%?&700;
 3090 NEXT T%
 3100 PRINT
 3110 =1
 3120 :
 4000 DEF FNVERIFY
 4010 LOCAL C%,P%
 4020 ON ERROR CLOSE#0:GOTO 130
 4030 C%=OPENIN($&706)
 4040 P%=256*?&8F-1
 4050 REPEAT
 4060 P%=P%+1
 4070 UNTIL ?P%<>BGET#C% OR P%=TOP
 4080 IF P%=TOP PRINT"File verified"
 4090 IF P%<>TOP PRINT"Verify error at location &";~P%
 4100 CLOSE#0
 4110 =1
 4120 :
 5000 DEF FNLVAR
 5010 LOCAL M%,S%,T%,R%,A%
 5020 S%=&700
 5030 FOR T%=130 TO 244 STEP 2
 5040 A%=T%!&400 AND &FFFF
 5050 REPEAT
 5060 IF A%>0 PROCvariables ELSE 5080
 5070 A%=!A% AND &FFFF
 5080 UNTIL A%<255
 5090 NEXT T%
 5100 =1
```

Continued ►

◄ Continued

```
 5110 :
 5120 DEF PROCvariables
 5130 $S%=CHR$(T%/2)
 5140 R%=A%+2
 5150 REPEAT
 5160 IF ?R%>0 $S%=$S%+CHR$(?R%):R%=R%+1
 5170 UNTIL ?R%=0
 5180 PRINT $S%;
 5190 IF R%?-1=40 GOTO 5300
 5200 PRINT "=";
 5210 IF R%?-1=36 GOTO 5240
 5220 PRINT ;EVAL($S%)
 5230 ENDPROC
 5240 VDU 34
 5250 FOR M%=0 TO R%?4-1
 5260 VDU M%?(R%!1 AND &FFFF)
 5270 NEXT M%
 5280 PRINT CHR$(34)
 5290 ENDPROC
 5300 FOR M%=2 TO R%?1 STEP 2
 5310 PRINT ;M%!R%-1 AND &FFFF;",";
 5320 NEXT M%
 5330 PRINT CHR$(127);CHR$(41)
 5340 ENDPROC
 5350 :
 6000 DEF FNBIN
 6010 LOCAL A%,T%
 6020 A%=EVAL($&704)
 6030 $&700=""
 6040 FOR T%=0 TO 7
 6050 $&700=STR$(SGN(A% AND 2^T%))+$&700
 6060 NEXT T%
 6070 PRINT $&700
 6080 =1
 6090 :
 7000 DEF FNDEC
 7010 LOCAL T%,A%,L%
 7020 T%=&70C
 7030 REPEAT
 7040 IF ?T%<48 OR ?T%>49 GOTO 7070
 7050 IF ?T%=49 A%=A%+(2^L%)
 7060 L%=L%+1
 7070 T%=T%-1
 7080 UNTIL T%<&703
 7090 PRINT A%
 7100 =1
 7110 :
 8000 DEF FNSILENCE
 8010 SOUND 16+EVAL($&708),0,0,0
 8020 =1
 8030 :
 9000 DEF FNDUMP
 9010 LOCAL A%,X%,Y%,S%,F%
 9020 IF LEN($&705)>0 A%=INSTR($&705,",")
 9030 S%=EVAL(LEFT$($&705,A%)) MOD &10000
 9040 F%=EVAL($(&705+A%)) MOD &10000
 9050 IF F%<0 OR S%<0 PRINT "Illegal Address":GOTO 9160
 9060 FOR Y%=S% TO F% STEP 8
 9070 $&700=" "
 9080 PRINT RIGHT$("0000"+STR$~Y%,4);
 9090 FOR X%=0 TO 7
 9100 A%=?(Y%+X%)
 9110 PRINT " ";RIGHT$("00"+STR$~A%,2);
 9120 IF A%>31 AND A%<127 $&700=$&700+CHR$(A%) ELSE $&700=$&700+"."
 9130 NEXT X%
 9140 PRINT $&700
 9150 NEXT Y%
```

Continued ►

◀ Ginns' listing 2 continued

```
 9160 PRINT
 9170 =1
 9180 :
10000 DEF FNKEY
10010 LOCAL S%,F%,C%,K%
10020 IF EVAL($&704)>15 OR EVAL($&704)<0
PRINT'"Badkey":GOTO 10160
10030 S%=?(&B00+EVAL($&704))
10040 PRINT'" *KEY ";EVAL($&704);" ";
10050 F%=?&B10
10060 IF S%=?&B10 GOTO 10150
10070 FOR C%=&B00 TO &B0F
10080 IF ?C%>S% AND ?C%<F% F%=?C%
10090 NEXT C%
10100 FOR C%=S% TO F%-1
10110 K%=C%?&B01
10120 IF K%>128 K%=K%-128:VDU 124,33
10130 IF K%>31 VDU K% ELSE VDU 124,K%+64
10140 NEXT C%
10150 PRINT
10160 =1
10170 :
11000 DEF FNRESET
11010 *KEY 10
11020 CALL !-4
11030 =1
```

See page 69

How to enter Da Doo ROM ROM

The three listings should be entered in the order PROG1, PROG2 and PROG3, saving each one before starting to type in the next. As with most assembler listings, you may find it helpful to set up the red function keys with commonly used mnemonics or character strings, eg:

**KEY 0 OPT FNequ*

Additionally, the AUTO 10 command will ensure that the correct line numbers are presented for you at the right moment.

The machine code is generated from &3000 onwards. The offset F% ensures that it will run correctly when it is moved up to the sideways ROM address space. In essence, F% is simply added to all absolute addresses. Consult the instruction manual supplied with your sideways RAM (or ROM) board on how to load this back into your sideways RAM.

*Having moved the code up to &8000, you will need to press Break in order to get the computer to recognise its presence. Note that entering *HELP won't produce any response apart from that resulting from other ROMs that you may have. This is simply because the main program does not check for service call 9 (HELP) in its service routine.*

Once all three programs have been saved on tape or disc, type:

CHAIN "PROG1"

There will be a delay of a few moments while each section is loaded in and run. The individual programs run a checksum on the code that they have produced, so if you do run into difficulties it is a bit easier to track down the offending section. Pay particular attention to the number of spaces between double quotation marks, as these will affect the length of the object code, and hence the checksums.

Lines 230-300 form a brief delay loop, so that you have a reasonable chance of getting your finger off the Return key before routine exits. This is because the DFS chip may be activated next, and this will perform a keyboard scan. If it finds that a key is pressed, then the cassette filing system will be activated instead of the DFS. Of course if this does happen, then it is a simple matter to press Break again to invoke the DFS.

Listing 1. Steve Picton's program implements a password feature. This listing contains the standard header code

```
 10 REM Listing 1 - Sideways ROM eg
 20 REM by S Picton
 30 REM BBC B/B+/128k and Electron
 40 REM with sideways RAM
 50 REM (c) Acorn User February 1986
 60 :
 70 MODE 6
 80 DIM M%(5)
 90 stack=&110
100 F%=&3000
110 FOR pass=0 TO 3 STEP 3
120 P%=&5000
130 [OPT pass
140 OPT FNequw(0)
150 OPT FNequb(0)
160 JMP service+F%
170 OPT FNequb(&82)
180 OPT FNequb(copy-&8000)
190 OPT FNequb(1)
200 .M%(2)
210 OPT FNequs("Anything")
220 .copy
230 OPT FNequb(0)
240 OPT FNequs("(C) Acorn User 1986")
250 OPT FNequb(0)
260 .service
270 PHP
280 PHA
290 TXA
300 PHA
310 TYA
320 PHA
330 TSX
340 LDA &103,X
350 EOR #3
360 BEQ rcode3
370 .exit
380 .M%(5)
390 PLA
400 TAY
410 PLA
420 TAX
430 PLA
440 PLP
450 RTS
460 .rcode3
470 CLI
480 TAX \ (X=0)
490 LDA #253
500 LDY #255
510 JSR &FFF4
520 CPX #2
530 BNE over
540 LDX #4
550 .moveloop
560 LDA M%(2)+F%,X
570 STA stack,X
580 DEX
590 BPL moveloop
600 \BMI opcode...
610 OPT FNequb(&30)
620 .M%(1)
630 \Dummy...
640 OPT FNequb(0)
650 .over
660 DEX
```

Continued ▶

Listing 1 continued

```
 670 \Exit if power-up;
 680 \must be soft BREAK
 690 BEQ exit
 700 LDX #4
 710 .compare
 720 LDA M%(2)+F%,X
 730 CMP stack,X
 740 BNE exit
 750 DEX
 760 BPL compare
 770 \BMI opcode...
 780 OPT FNequb(&30)
 790 .M%(3)
 800 \Dummy...
 810 OPT FNequb(0)
 820 \Ask for password...
 830 .M%(4)
 840 LDX #0
 850 .loop
 860 LDA prompt+F%,X
 870 JSR &FFE3
 880 INX
 890 CMP #ASC"?"
 900 BNE loop
 910 RTS
 920 .prompt
 930 OPT FNequs("Password?")
 940 ]NEXT pass
 950 PROCsavearray
 960 PROCcheckcode
 970 CHAIN "PICTON2"
 980 :
 990 DEF FNequw(A%)
1000 ?P%=A% MOD 256
1010 ?(P%+1)=A% DIV 256
1020 P%=P%+2
1030 =pass
1040 :
1050 DEF FNequb(A%)
1060 ?P%=A% MOD 256
1070 P%=P%+1
1080 =pass
1090 :
1100 DEF FNequd(A%)
1110 !P%=A%
1120 P%=P%+4
1130 =pass
1140 :
1150 DEF FNequs(A$)
1160 $P%=A$
1170 P%=P%+LEN(A$)
1180 =pass
1190 :
1200 DEF PROCsavearray
1210 FOR N%=0 TO 5
1220 !(&900+2*N%)=M%(N%)
1230 NEXT N%
1240 ENDPROC
1250 :
1260 DEF PROCcheckcode
1270 IF P%<>&507E THEN 1330
1280 sum=0
1290 FOR K%=&5000 TO P%-1
1300 sum=sum+?K%
1310 NEXT K%
1320 IF sum=&33BA THEN ENDPROC
1330 PRINT "Check listing":VDU 7
1340 STOP
```

Listing 2. Part of the main code

```
 10 REM Listing 2
 20 REM by S Picton
 30 REM BBC B/B+/128k and Electron
 40 REM with sideways RAM
 50 REM (c) Acorn User February 1986
 60 :
 70 DIM M%(6)
 80 addr%=P%
 90 buffer=&130
100 printmess=FNa(4)
110 FOR pass=0 TO 3 STEP 3
120 P%=addr%
130 [OPT pass
140 .data
150 \No. of chars. in password...
160 OPT FNequb(5)
170 \Password itself...
180 OPT FNequs("MICRO")
190 \Deal with Ctrl-BREAK
200 .again
210 JSR &FFE7
220 .start
230 JSR printmess+F%
240 LDX #0
250 .osrdch
260 JSR &FFE0
270 BCS escape
280 CMP #13
290 BEQ test
300 STA buffer,X
310 INX
320 \Max no. of chars?
330 CPX #20
340 BNE osrdch
350 .test
360 CPX data+F%
370 BNE again
380 DEX
390 .loop
400 LDA data+1+F%,X
410 CMP buffer,X
420 BNE again
430 DEX
440 BPL loop
450 \BMI...
460 OPT FNequb(&30)
470 .M%(6)
480 \Dummy...
490 OPT FNequb(0)
500 .escape
510 TXA
520 PHA
530 LDA #126
540 JSR &FFF4
550 PLA
560 TAX
570 JMP osrdch+F%
580 ]NEXT
590 !(&900+2*6)=M%(6)
600 s=FNa(1):?s=start-s-1
610 s=FNa(3):?s=start-s-1
620 PROCcheckcode
630 CHAIN "PICTON3"
640 :
650 DEF FNa(A%)=(!(&900+2*A%))AND&FFFF
660 DEF FNequb(A%)
670 ?P%=A% MOD 256
680 P%=P%+1
690 =pass
```

Continued ►

◀ Picton's listing 2 continued

```
 700 :
 710 DEF FNequs(A$)
 720 $P%=A$
 730 P%=P%+LEN(A$)
 740 =pass
 750 :
 760 DEF PROCcheckcode
 770 IF P%<>&50BC THEN 830
 780 sum=0
 790 FOR K%=&5000 TO P%-1
 800 sum=sum+?K%
 810 NEXT K%
 820 IF sum=&538D THEN ENDPROC
 830 PRINT "Check listing":VDU 7
 840 STOP
```

Listing 3. Part of the main code

```
  10 REM Listing 3
  20 REM by S Picton
  30 REM BBC B/B+/128k and Electron
  40 REM with sideways RAM
  50 REM (c) Acorn User February 1986
  60 :
  70 addr%=P%
  80 stack=&110
  90 exit=FNa(5)
 100 FOR pass=0 TO 3 STEP 3
 110 P%=addr%
 120 [OPT pass
 130 \Delete nos. in stack
 140 .start
 150 LDA #0
 160 LDX #4
 170 .delete
 180 STA stack,X
 190 DEX
 200 BPL delete
 210 JSR &FFE7
 220 JSR &FFE7
 230 LDX #150
 240 .outloop
 250 LDY #0
 260 .inloop
 270 DEY
 280 BNE inloop
 290 DEX
 300 BNE outloop
 310 JMP exit+F%
 320 ]NEXT
 330 s=FNa(6):?s=start-s-1
 340 PROCcheckcode
 350 END
 360 :
 370 DEF FNa(A%)=(!(&900+2*A%))AND&FFFF
 380 :
 390 DEF PROCcheckcode
 400 IF P%<>&50D9 THEN 460
 410 sum=0
 420 FOR K%=&5000 TO P%-1
 430 sum=sum+?K%
 440 NEXT K%
 450 IF sum=&6335 THEN ENDPROC
 460 PRINT "Check listing":VDU 7
 470 STOP
```

See Elite Commander, page 95

Using the Elite Editor on an Electron

If you have an Elk then you will need to delete lines 180, 200, 2620, 2630, 2650, and 2660 from the listing before using the editor. Also, the following lines should be entered instead of those printed in the listing:

70 MODE 6

1510 VDU 32

2270 PRINT " ";

2390 PRINT "]";

2640 PRINT TAB (9,1) "Elite Commander Editor"

Using the Editor with a Cassette-based System

If you are using a cassette-based system then you must delete lines 1820 to 1900 from the Elite Editor before using it.

Also delete the "E." from lines 1810 and 2780.

Listing 1. Elite Commander Editor

```
  10 REM Elite Commander Editor
  20 REM by P Springate and P Skirrow
  30 REM BBC B/B+/128k and Electron
  40 REM (c) Acorn User February 1986
  50  :
  60 *FX 4,1
  70 MODE 7
  80 DIM byte%(&4F),message$(&4F)
  90 DIM type%(&4F),value%(&4F)
 100 DIM temp%(3)
 110 hex$="0123456789ABCDEF"
 120 PROCinit
 130 PROCnames
 140 IF inname$=CHR$(0) THEN 310
 150 current%=0
 160 PROCtitle
 170 PRINT"Editing Commander ";
 180 VDU 157,132
 190 PRINT outname$;SPC(2);
 200 VDU 156,135
 210 PRINT
 220 PROCdump
 230 ON ERROR GOTO 260
 240 PROCedit
 250 GOTO 240
 260 IF ERR=17 THEN 280
 270 REPORT:PRINT" at ";ERL:GOTO310
 280 ON ERROR GOTO 160
 290 PROCsave
 300 VDU 12
 310 *FX 4
 320 END
 330 :
 340 DEF PROCedit
 350 PROCinverse
 360 VDU 28,0,13,39,7,12,26
 370 PRINT TAB(0,7)message$(current%)
 380 IF type%(current%)=2 PROCcash
 390 IF type%(current%)=3 PROCfitted
 400 key$=FNuppercase(GET$)
 410 key%=ASC(key$)
 420 IF key%<136 AND key%<>13 THEN 460
 430 PROCreplace
 440 PROCmove
 450 GOTO 350
 460 IF key$="." THEN 500
```

Continued ▶

◀ Listing 1 continued

```
470 IF key$>="0" AND key$<="Z" THEN 500
480 GOTO 400
490 :
500 REM Must be a value for the byte
510 PRINTkey$;:value$=key$
520 REPEAT
530 key$=FNuppercase(GET$)
540 IF ASC(key$)<>127 THEN 570
550 PRINT key$;
560 value$=LEFT$(value$,LEN(value$)-1)
570 IF key$<>"." THEN 600
580 PRINT key$;
590 value$=value$+ key$
600 IF key$<"0" OR key$>"Z" THEN 630
610 PRINT key$;
620 value$=value$+key$
630 UNTIL value$="" OR ASC(key$)=13
640 IF value$="" THEN 400
650 :
660 IF type%(current%)<>0 THEN 700
670 PRINT'"Change not permitted here"
680 VDU 7:A%=GET
690 GOTO 350
700 ON type%(current%) GOSUB 760,920,840
710 PROCreplace
720 current%=(current%+1) MOD &50
730 ENDPROC
740 :
750 REM Value is hex numeric in type
760 value$=RIGHT$( "00"+value$,2)
770 IF FNhex(value$) THEN 780 ELSE 800
780 byte%(current%)=EVAL("&"+value$)
790 RETURN
800 current%=current%-1
810 RETURN
820 :
830 REM Value is a yes/no decision
840 IF value$="Y" byte%(current%)=value%
(current%)
850 IF value$="N" byte%(current%)=0
860 RETURN
870 :
880 REM Edit amount of cash
890 REM (the max. number of credits
900 REM is too large to be stored as
910 REM an integer)
920 inst%=INSTR(value$, ".")
930 IF inst%=0 inst%=LEN(value$)+1
940 IF inst%<10 THEN 970
950 IF inst%>10 carry%=1:GOTO 1050
960 IF value$>"429496729.5" carry%=1:GOT
O 1050
970 value%=VAL(value$)
980 carry%=10*VAL(value$)-10*value%
990 FOR count%=0 TO 3
1000 x%=carry%+10*(value% MOD 256)
1010 carry%=x% DIV 256
1020 temp%(count%)=x% MOD 256
1030 value%=value% DIV 256
1040 NEXT count%
1050 IF carry%=0 THEN 1100
1060 PRINT '"Too large"
1070 current%=current%-1
1080 VDU 7:A%=GET
1090 GOTO 1160
1100 FOR count%=3 TO 0 STEP -1
1110 byte%(current%)=temp%(count%)
1120 PROCreplace
1130 current%=current%+1
```

Continued ▶

◀ Continued

```
1140 NEXT count%
1150 current%=current%-1
1160 RETURN
1170 :
1180 REM Print out cash in decimal
1190 DEF PROCcash
1200 PRINT "Amount as present is ";
1210 cash=0
1220 FOR count%=0 TO 3
1230 cash=256*cash+byte%(current%+count%)
1240 NEXT count%
1250 PRINT ;cash/10
1260 ENDPROC
1270 :
1280 REM Print whether extra is fitted
1290 DEF PROCfitted
1300 PRINT "At present it is";
1310 IF byte%(current%)=0 PRINT " NOT";
1320 PRINT " fitted"
1330 ENDPROC
1340 :
1350 REM To check only hex chars
1360 DEF FNhex(X$)
1370 hex%=TRUE
1380 FOR count%=0 TO 1
1390 dig$=MID$(X$,LEN(X$)-count%,1)
1400 hex%=hex% AND INSTR(hex$,dig$)<>0
1410 NEXT count%
1420 =hex%
1430 :
1440 REM Replace value in the grid
1450 DEF PROCreplace
1460 IF current%<0 THEN 1540
1470 IF current%>&4F THEN 1540
1480 VDU 31
1490 VDU 4+4*(current% MOD 8)
1500 VDU 14+(current% DIV 8)
1510 VDU 130
1520 PROCnumber(byte%(current%))
1530 PRINT SPC(1);
1540 ENDPROC
1550 :
1560 REM Move (cursor keys and <ret>)
1570 DEF PROCmove
1580 IF key%<>13 GOTO 1610
1590 current%=(current%+1) MOD &50
1600 ENDPROC
1610 across%=current% MOD 8
1620 down%=current% DIV 8
1630 across%=across%-7*(key%=136)
1640 across%=across%-(key%=137)
1650 down%=down%-9*(key%=139)
1660 down%=down%-(key%=138)
1670 across%=across% MOD 8
1680 down%=down% MOD 10
1690 current%=8*down%+across%
1700 ENDPROC
1710 :
1720 REM Get names of both commanders
1730 DEF PROCnames
1740 PROCtitle
1750 PRINT "Old Commander, <ret> = ";
1760 INPUT "JAMESON  "',inname$
1770 IF inname$<>"" THEN 1810
1780 inname$="JAMESON"
1790 PROCjameson
1800 GOTO 1920
1810 infile%=OPENIN("E."+inname$)
1820 IF infile%<>0 THEN 1860
```

Continued ▶

◀ Elite listing 1 continued

```
 1830 PRINT inname$ ;" not found"
 1840 inname$=CHR$(0)
 1850 GOTO 1950
 1860 IF EXT#infile%=&100 THEN 1910
 1870 PRINT inname$;
 1880 PRINT " is not an Elite File"
 1890 inname$=CHR$(0)
 1900 GOTO 1950
 1910 PROCreadfile
 1920 PRINT"New Commander, <RET> = same"
 1930 INPUT outname$
 1940 IF outname$="" outname$=inname$
 1950 ENDPROC
 1960 :
 1970 REM Set up Jamesons default data
 1980 DEF PROCjameson
 1990 C%=0
 2000 FOR down%=0 TO 9
 2010 READ data$
 2020 FOR across%=0 TO 7
 2030 A%=EVAL("&"+MID$(data$,2*across%+1,2
))
 2040 C%=C%+A%
 2050 byte%(8*down%+across%)=A%
 2060 NEXT across%,down%
 2070 IF C%<>1621 PRINT"Jameson data is wr
ong":END
 2080 ENDPROC
 2090 :
 2100 REM Read Elite file into array
 2110 DEF PROCreadfile
 2120 FOR count%=0 TO &4F
 2130 byte%(count%)=BGET#infile%
 2140 NEXT count%
 2150 CLOSE#infile%
 2160 ENDPROC
 2170 :
 2180 REM Display the file as a '*DUMP'
 2190 DEF PROCdump
 2200 PRINT TAB(0,14);
 2210 byte%=0
 2220 FOR down%=0TO9
 2230 PROCnumber(8*down%)
 2240 PRINT ":";
 2250 FOR across%=0 TO 7
 2260 PRINT TAB(4+(across%*4));
 2270 PRINT CHR$(130);
 2280 PROCnumber(byte%(byte%))
 2290 byte%=byte%+1
 2300 NEXT across%:PRINT
 2310 NEXT down%
 2320 ENDPROC
 2330 :
 2340 REM Highlight No. being edited
 2350 DEF PROCinverse
 2360 VDU 31
 2370 VDU 3+4*(current% MOD 8)
 2380 VDU 14+(current% DIV 8)
 2390 PRINT CHR$(135);"]";
 2400 PROCnumber(byte%(current%))
 2410 PRINT "[";
 2420 ENDPROC
 2430 :
 2440 REM Print a number as 2 char hex
 2450 DEF PROCnumber(X%)
 2460 IF X%<&10 THEN PRINT"0";
 2470 PRINT ;~X%;
 2480 ENDPROC
 2490 :
```

Continued ▶

◀ Continued

```
 2500 REM Read messages into array
 2510 DEF PROCinit
 2520 FOR count%=0 TO &4F
 2530 READ message$(count%)
 2540 READ type%(count%)
 2550 READ value%(count%)
 2560 NEXT count%
 2570 ENDPROC
 2580 :
 2590 REM To print the title
 2600 DEF PROCtitle
 2610 CLS
 2620 FOR count%=1 TO 2
 2630 PRINT TAB(5);:VDU 157,132,141
 2640 PRINT "Elite Commander Editor  ";
 2650 VDU 156,135
 2660 NEXT count%
 2670 PRINT''
 2680 ENDPROC
 2690 :
 2700 REM To save the commander
 2710 DEF PROCsave
 2720 PRINT '"Save or Quit (S or Q)? ";
 2730 key$=FNuppercase(GET$)
 2740 IF key$<>"S" AND key$<>"Q" THEN 2730
 2750 PRINT key$
 2760 IF key$="Q" THEN 2950
 2770 byte%(&E)=byte%(&E) OR &80
 2780 outfile%=OPENOUT("E."+outname$)
 2790 FOR count%=0 TO &49
 2800 BPUT#outfile%,byte%(count%)
 2810 NEXT count%
 2820 A%=&49:C%=0
 2830 FOR count%=&49 TO 1 STEP-1
 2840 A%=A%+byte%(count%-1)+C%
 2850 C%=A% DIV 256
 2860 A%=A% AND &FF
 2870 A%=A% EOR byte%(count%)
 2880 NEXT count%
 2890 BPUT#outfile%,A% EOR &49
 2900 BPUT#outfile%,A%
 2910 FOR count%=&4C TO &FF
 2920 BPUT#outfile%,0
 2930 NEXT count%
 2940 CLOSE#0
 2950 ENDPROC
 2960 :
 2970 REM Ensure that char is uppercase
 2980 DEF FNuppercase(a$)
 2990 IF a$>="a" AND a$<="z" a$=CHR$(ASC(a
$)-32)
 3000 =a$
 3010 :
 3020 REM Messages to be printed out
 3030 DATA "Mission Control, 1=1st mission
, A=2nd",1,0
 3040 DATA "Ships X co-ordinate",1,0
 3050 DATA "Ships Y co-ordinate",1,0
 3060 DATA "Galaxy Data byte 0",1,0
 3070 DATA "Galaxy Data byte 1",1,0
 3080 DATA "Galaxy Data byte 2",1,0
 3090 DATA "Galaxy Data byte 3",1,0
 3100 DATA "Galaxy Data byte 4",1,0
 3110 DATA "Galaxy Data byte 5",1,0
 3120 DATA "Credits (decimal, <=429,496,72
9.5)",2,4
 3130 DATA "see creds",0,0
 3140 DATA "see creds",0,0
 3150 DATA "see creds",0,0
```

Continued ▶

◀ **Listing 1 continued**

```
 3160 DATA "Fuel (in units of 0.1 light ye
ars)",1,0
 3170 DATA "?",1,0
 3180 DATA "Galaxy number - 1",1,0
 3190 DATA "Front laser power (00,&0F,&32,
&8F,&97)",1,0
 3200 DATA "Rear laser power (00,&0F,&32,&
8F,&97)",1,0
 3210 DATA "Left laser power (00,&0F,&32,&
8F,&97)",1,0
 3220 DATA "Right laser power (00,&0F,&32,
&8F,&97)",1,0
 3230 DATA "?",1,0,"?",1,0
 3240 DATA "Cargo capacity + 2",1,0
 3250 DATA "Present Cargo: Tons of Food",1
,0
 3260 DATA "Present Cargo: Tons of Textile
s",1,0
 3270 DATA "Present Cargo: Tons of Radio's
",1,0
 3280 DATA "Present Cargo: Tons of Slaves"
,1,0
 3290 DATA "Present Cargo: Tons of Liquor"
,1,0
 3300 DATA "Present Cargo: Tons of Luxurie
s",1,0
 3310 DATA "Present Cargo: Tons of Narcoti
cs",1,0
 3320 DATA "Present Cargo: Tons of Compute
rs",1,0
 3330 DATA "Present Cargo: Tons of Mach'ry
",1,0
 3340 DATA "Present Cargo: Tons of Alloys"
,1,0
 3350 DATA "Present Cargo: Tons of Firearm
s",1,0
 3360 DATA "Present Cargo: Tons of Furs",1
,0
 3370 DATA "Present Cargo: Kg's of Mineral
s",1,0
 3380 DATA "Present Cargo: Kg's of Gold",1
,0
 3390 DATA "Present Cargo: Kg's of Platinu
m",1,0
 3400 DATA "Present Cargo: g's of Gem-ston
es",1,0
 3410 DATA "Present Cargo: Tons of Aliens"
,1,0
 3420 DATA "E.C.M. fitted (Y/N)",3,&FF
 3430 DATA "Fuel Scoop fitted (Y/N)",3,&FF
 3440 DATA "Energy Bomb fitted (Y/N)",3,&7
F
 3450 DATA "Strength Of Energy Unit",1,0
 3460 DATA "Docking Comp's fitted (Y/N)",3
,&FF
 3470 DATA "Galactic H'drive fitted (Y/N)"
,3,&FF
 3480 DATA "Escape Pod fitted (Y/N)",3,&FF
 3490 DATA "?",1,0,"?",1,0,"?",1,0,"?",1,0
 3500 DATA "Number of Missiles Fitted",1,0
 3510 DATA "Legal status (0=clean)",1,0
 3520 DATA "Space Station's goods: Tons of
Food",1,0
 3530 DATA "Space Station's goods: Tons of
Textiles",1,0
 3540 DATA "Space Station's goods: Tons of
Radio's",1,0
 3550 DATA "Space Station's goods: Tons of
Slaves",1,0
```

Continued ▶

◀ **Continued**

```
 3560 DATA "Space Station's goods: Tons of
Liquor",1,0
 3570 DATA "Space Station's goods: Tons of
Luxuries",1,0
 3580 DATA "Space Station's goods: Tons of
Narcotics",1,0
 3590 DATA "Space Station's goods: Tons of
Computers",1,0
 3600 DATA "Space Station's goods: Tons of
Mach'ry",1,0
 3610 DATA "Space Station's goods: Tons of
Alloys",1,0
 3620 DATA "Space Station's goods: Tons of
Firearms",1,0
 3630 DATA "Space Station's goods: Tons of
Furs",1,0
 3640 DATA "Space Station's goods: Kg's of
Minerals",1,0
 3650 DATA "Space Station's goods: Kg's of
Gold",1,0
 3660 DATA "Space Station's goods: Kg's of
Platinum",1,0
 3670 DATA "Space Station's goods: g's of
Gem-stones",1,0
 3680 DATA "Space Station's Aliens (ignore
d)",1,0
 3690 DATA "Space Station's 'random price'
control",1,0
 3700 DATA "Current Score (lsb)",1,0
 3710 DATA "Current Score (msb)",1,0
 3720 DATA "??? (No of times dock -> 0)",1
,0
 3730 DATA "KEY (will be changed)",0,0
 3740 DATA "KEY (will be changed)",0,0
 3750 DATA "Nothing",0,0
 3760 DATA "Nothing",0,0
 3770 DATA "Nothing",0,0
 3780 DATA "Nothing",0,0
 3790 :
 3800 REM Data for Commander Jameson
 3810 DATA "0014AD4A5A480253"
 3820 DATA "B7000003E8460400"
 3830 DATA "0F00000000001600"
 3840 DATA "0000000000000000"
 3850 DATA "0000000000000000"
 3860 DATA "0000000000000000"
 3870 DATA "0000000300100F11"
 3880 DATA "00031C0E00000A00"
 3890 DATA "113A070908000000"
 3900 DATA "0040E74E00000000"
```

Beeb Forum, see page 123

Listing 2. Mike MacManara's coder program. For Wordwise users only

```
X%=OPENIN "ABBR"
REPEAT
S$=GLF$#X%
R$=GLF$#X%
CURSOR TOP
REPEAT
REPLACE S$,R$
UNTIL EOT
UNTIL EOF#X%
CLOSE#X%
CURSOR TOP
DISPLAY
```

Listing 3. Mike MacManara's decoder program. For Wordwise users only

```
X%=OPENIN "ABBR"
REPEAT
S$=GLF$#X%
R$=GLF$#X%
CURSOR TOP
REPEAT
REPLACE R$,S$
UNTIL EOT
UNTIL EOF#X%
CLOSE#X%
CURSOR TOP
DISPLAY
```

YELLOW PAGES

REVIEWS

Joystick reviews, see page 180

Listing 1. A visual comparison of both switched and analogue joysticks

```
 10 REM Listing 1 - A quick joystick
 20 REM sensitivity test
 30 REM BBC B/B+/128k and Electron
 40 REM (c) Acorn User February 1986
 50 :
 60 MODE 4
 70 MOVE 640,512
 80 REPEAT
 90 x=ADVAL1/51.2
100 x=1280-x
110 y=ADVAL2/63.98
120 DRAW x,y
130 UNTIL 0
```

Listing 2. Converts a twin joystick game to run on a single unit

```
 10 REM Listing 2 - Conversion
 20 REM program to run twin joystick
 30 REM games on a single analogue
 40 REM joystick
 50 REM BBC B/B+/128k and Electron
 60 REM (c) Acorn User February 1986
 70 :
 80 I%=&A00
 90 oldv%=?&20A+256*?&20B
100 FOR opt%=0 TO 3 STEP 3
110 P%=I%
120 [OPT opt%
130 PHP
140 CMP #&80
150 BNE out
160 CPX #0
170 BEQ fire
180 CPX #3
190 BEQ chan1
200 CPX #4
210 BEQ chan2
220 BNE out
230 .chan1
240 LDX #1
250 JMP out
260 .chan2
270 LDX #2
280 JMP out
290 .out
300 PLP
310 JMP oldv%
320 .fire
330 JSR oldv%
340 TXA
350 AND #3
360 BEQ fin
370 LDX #01
380 .fin
390 PLP
400 RTS
410 ]
420 NEXT
430 ?&20A=0
440 ?&20B=&A
450 REM If you are using a Delta 14b
460 REM or a Delta 3b single then
470 REM delete lines 160, 170, 320,
480 REM 330, 340, 350, 360 and 370
```

Listing 3. Simulates movements of a switched joystick for analogue joystick users

```
 10 REM Listing 3 - To simulate
 20 REM switched joysticks on an
 30 REM analogue joystick
 40 REM BBC B/B+/128k and Electron
 50 REM (c) Acorn User February 86
 60 :
 70 I%=&A00
 80 FOR opt%=0 TO 3 STEP 3
 90 P%=I%
100 [OPT opt%
110 CMP #&80
120 BNE out
130 CPX #1
140 BMI out
150 CPX #5
160 BCS out
170 JSR &A2D
180 CPY #&A8
190 BCS up
200 CPY #&58
210 BMI down
220 JMP fin
230 .up
240 LDY #&FF
250 LDX #&FF
260 JMP fin
270 .down
280 LDY #0
290 LDX #0
300 .fin
310 RTS
320 .out
330 JMP (&A2E)
340 ]
350 NEXT
360 ?&A2D=&4C
370 [:SEI:]
380 ?&A2E=?&20A:?&20A=0
390 ?&A2F=?&20B:?&20B=&A
400 [:CLI:]
410 REM For different sensitivities
420 REM use the following values from
430 REM the table in lines 180 & 200
440 REM <-more sens. less sens.->
450 REM Line 180: &A8,&B0,&B8,&C0,
460 REM &C8,&D0,&D8,&E0,&E8
470 REM Line 200: &58,&50,&48,&40
480 REM &38,&30,&28,&20,&18
```

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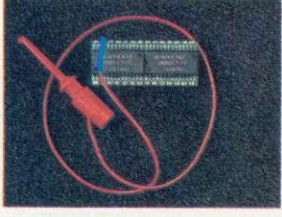
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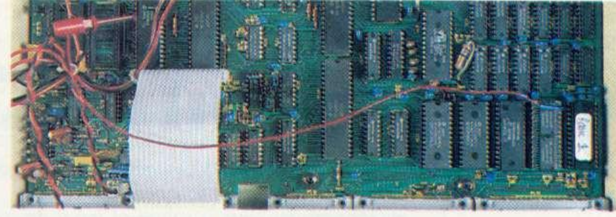
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BEEB FORUM

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WATCH THE SMALL PRINT

Graham Parry of Keerbergen, Belgium has been playing around with his new acquisition, an Epson LX80. He has developed what he calls a half height condensed/elite type mode, the incredible result of which can be seen in figure 1. Basically what Graham has done is to tidy up the already available superscript condensed/elite mode by altering the line spacing to the printer. Italics and double width work as normal in this mode; however, superscript, subscript and underlining will not.

```
10 REM Beeb Forum listing 1
20 REM by Graham Parry, Belgium
30 REM (c) Acorn User Feb 1986
40 :
50 VDU 1,27,1,51,1,16
60 VDU 1,27,1,77
70 VDU 1,15
80 VDU 1,27,1,83,1,48
90 VDU2
100 FOR N%=0 TO 4
110 FOR C%=32 TO 127
120 VDU C%:NEXT
130 NEXT
140 VDU3
```

Listing 1. Produces the print in figure 1

We managed to test the listing (listing 1) on the office Epson FX80 and Star and it worked fine, which should mean that it will work on most, if not all, Epson compatible printers. *Wordwise* users can print text (great for the small print!) using the following OC sequence:

OC27,51,16,27,77,15,27,83,48

£10

FASTER AND FASTER

Geoff Smith (this name seems to be getting popular) of Worcester Park was one of several people who wrote in with some improvement ideas to the Fast Forward Cassette Operation by Andrew Rowlands in November.

Geoff says: It is not sufficient simply to reset the OSFILE vector to &C00 after pressing Break. The routine runs over into page &D; consequently when Break is pressed location &D00 is reset to &40 (RTI) on a tape-only system. On a tape system it is therefore necessary to ?&D00=3 to correct this. Of course the machine code could be assembled into pages &9 and &A.

There are three instructions in the transferred code which refer to locations outside the extent of the code, namely:

&C25 : BNE &BD7
&C3B : BEQ &BF7
&C79 : BMI &CC4

The third of these explains why it is necessary to press Escape after the (*)SAVE has finished. The BMI &CC4 is effectively testing the status of &3CA, a flag byte. If this is negative the last block has just been written out and we need an RTS (ie, at &CC4). Since &CC4 is occupied by our new code, and there is no RTS within range of &C79 we must fix the &C83 routine as follows:

?&D02 = &A	– advance 10 bytes
?&D0B = &68	– PLA
?&D0C = &68	– PLA
?&D0D = &60	– RTS

Now (*)SAVE will terminate correctly.

£5

INTO THE SHADOWS

Colin Robertson from Maidenhead has come up with a neat way of insuring machine compatibility when using the *SHADOW command. Colin explains: When writing a !BOOT file to initialise software on a BBC B+, it is useful to include the command *SHADOW 0 to enable the shadow RAM facility, which is implemented by the first mode change occuring in the software itself.

Such a !BOOT file will not run on a BBC B machine because *SHADOW 0 is not recognised and produces the "Bad command" error. To trap this error, a dummy machine code file can be created on the disc, with the name SHADOW. On the B+, *SHADOW 0 will be accepted by the operating system as intended. On other machines, the operating system will pass the command to the DFS, which will *RUN the dummy program and return to the next command in the !BOOT file. The assembler program for the dummy file is as follows:

```
10 P%=&70:[:RTS:]:END
```

Run this to assemble the code. Then save the code to disc with:

*SAVE SHADOW 70 71

The location &70, in which the single-byte dummy program is contained, should be available on any machine during the execution of a !BOOT file before *Wordwise Plus* or other software is called (after having been called, the software may overwrite this location).

Note that because the dummy program is called SHADOW and not SHADOW0, it is important to include the space in the command *SHADOW 0. This space is recognised in the DFS as a filename terminator. The trap is thus equally effective with *SHADOW 1.

£10

CUTTING IT SHORT

Mike McNamara of New Southgate uses *Wordwise Plus* to help him abbreviate text files or expand the abbreviations back to normal text. Listings 2 and 3 on the yellow pages show his coder and decoder programs.

In addition to these procedures the system also requires a file of the words/phrases to be abbreviated along with the abbreviations, eg,

Wordwise
W.W.
Acorn User
AU

Each word/phrase or abbreviation must be followed by a carriage return since the procedures rely on the GLF# command of *Wordwise Plus*.

Once this list is complete, save it on disc as ABBR – this file must be available to the computer when the two procedures are called. To use them, first place the required procedure in a suitable segment. Ensure that the ABBR file is available to *WW+*. Enter the text to be acted on in *WW+*. Activate the procedure with <Shift> + f(n). Remember that the same ABBR file is used for coding and decoding. Also, do not use abbreviations which are simply shortened versions of the word, for instance, Mon for Monday, otherwise odd things may happen!

For Beeb Forum listings 2 and 3 see yellow page 119

```
 !"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{|}~ !"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'
abcdefghijklmnopqrstuvwxyz{|}~ !"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{|}~ !"£$%&'()*+,-./0123456789:;<=>?@AB
CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{|}~ !"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{|}~
```

Figure 1. The incredible result of running Graham Parry's small print program (listing 1) – this is actual size!

ATOM FORUM

Mike Barwise muses on communications and presents an auto line numbering routine

£10

AUTO LINE IN STYLE

Charles Robson of Nuneaton has sent in a very nice auto line numbering routine, listing 1. He writes. . . It also allows lines of up to 250 characters in length to be entered into the computer. The program is written in position-independent code and therefore can be *LOADed to any suitable address. The code automatically searches for the last line number of the program and puts all new lines at the end of your program. Return, Delete and Escape all have their normal uses. Escape can be pressed at any time to return to command mode, but the best time to do this is when the computer presents you with a new line number, else the last three characters typed will be lost as the program 'tidies up'. When you have finished typing, it is best to enter OLD to reset the program pointers, but this is not essential. One must have at least one line already present in memory, or the computer searches for a non-existent line number.

```
    1 REM AUTOMATIC LINE NUMBERING
    2 REM BY CHARLES ROBSON
    3 REM (C) ACORN USER FEBRUARY 1986
   10 Q=#70;DIM LL5;F.I=0TO5;LLI=-1;
N.;P.$21;F.I=0TO1;P=#2800
   15 [
   20 :LL5 LDA#D;STAQ;LDA#E;STAQ+1
   30 DECQ+1;LDY@253;LDA(Q),Y;DEY;CMP@13;
BNEP-5;INY;INY;INY
   40 LDA(Q),Y;STAQ+2;DEY;LDA(Q),Y;STAQ+3
   50 LDA#D;SEC;SBC@2;STAQ;LDA#E;SBC@0;
STAQ+1
   60 LDAQ+2;CLC;ADA@10;STAQ+2;LDAQ+3;
ADC@0;STAQ+3
   70 :LLO LDA@13;LDY@0
   80 STA(Q),Y;INY;LDA@5;STA#321
   90 LDAQ+3;STA(Q),Y;INY
  100 LDAQ+2;STA(Q),Y;INY
  110 TYA;PHA
  120 LDAQ+3;STA#25;LDAQ+2;STA#16;JSR#C589
  130 PLA;TAY
  140 LDAQ+2;CLC;ADC@10;STAQ+2
  150 LDAQ+3;ADC@0;STAQ+3
  160 LDA@32;JSR#FFF4
  170 :LL4 JSR#FFE6;CMP@13;BEQ LL1;CMP[127;
BEQ LL2
  180 CMP@27;BEQ LL3
  190 STA(Q),Y;INY
  200 CPY@250;BNE LL4
  210 :LL1 TYA;CLC;ADCQ;STAQ;LDAQ+1;ADC@0;
STAQ+1
  220 SEC;BCS LLO
  230 :LL2 DEY;CPY@2;BNE LL4;LDY@8;
JSR#FFF4;INY;BNE LL4
  240 :LL3 DEY;DEY;DEY;LDA@13;STA(Q),Y;
LDA@255;INY;STA(Q),Y;RTS
  250 ];N.;P.$6;E.
```

Listing 1. Charles Robson's auto line numbering program allows lines 250 characters long

Line numbers increment in tens, but this can be altered to taste in lines 60 and 140 by altering the ADC@10. Also, lines 250 characters long can be altered by changing the CPY@250 in line 200 to your maximum length. If you type a line longer than the maximum, the program will enter the long line and present you with a new line-number. The zero page locations used are:

#70,71 Address of next character in line.

#72,73 Line number of next line.

#OD, OE Hold the current value of TOP.

Quite apart from being a well thought out routine, Charles has probably done better than anyone so far in terms of presentation: position independent code with internal error trapping, documentation of scratchpad use and notes on user adaptation. My only minor niggle is that two of his zero page addresses (#72,#73) need not have been zero page, but that's just me going on about style again.

Thanks for a shining example of programming, Charles. We're sending you a tenner.

COMMUNICATIONS CONSIDERED

John Cozens of Reading asks: can the Atom be used with a modem? The answer is, as usual, yes in general, but we must really be more specific than this.

To use a modem, you need a serial data channel. This must be capable of both transmitting and receiving data, so a serial printer port will not do. You must also decide what type of communication you require. The options are:

1 Communication between computer users only;

2 Communication with host systems like Telecom Gold, supplying data in a continuous stream;

3 Communication with host systems like Prestel, supplying data as a fully formatted frame or screen page.

The type of communication will determine not only the software you need, but the type of hardware. We will look at the requirements for each alternative, but first we must define some terminology. Modes of operation are:

Simplex. You phone your mate and tell him to set up his receiver for a file you want to send. Communication is one-way only. Simplex is now seldom used for comms, its place having been taken by half duplex. Simplex is still used for peripheral driving, eg, printers.

Half duplex. One of you transmits while the other receives, and then you both switch over at a pre-arranged signal for communication in the other direction. If errors are detected by the receiver, the whole block must be requested for re-transmission, and the transmitted block must not exceed the memory capacity of the receiver, as nothing can stop transmission until the end of the block. Errors can only be demonstrated by something not looking right to the receiving end. The transmitter echoes each character to its own screen.

Full duplex. Both of you may transmit characters in the gaps between received characters. It is possible to control the incoming transmission by sending a command while receiving. Transmission can thus be paused to save the buffer, allowing much longer documents to be handled. Each character transmitted is echoed back by re-transmission on the return channel. The returned character only is presented to the transmitter VDU. Instant verification of each character by the transmitter is thus possible, in addition to the control provided by simultaneous two-way communication.

Note that even when working half or full duplex, only one party is transmitting bulk data at any time. The other is using its return transmission capability for control of the transmission.

Practically all database communications (Gold, Distel, etc) use the additional concept of host and user. The host is the normal source of bulk information (the number you phone to log on), and you are the user. In full duplex communications, only the host echoes back characters to the user, even when the user is sending a long file to the host.

Within duplex modes, it is possible to communicate at either equal or differential baud rates (bits per second) on the outward and receive channels. Typical examples are 300/300 (equal rates), 1200/75 (1200 from host to user, 75 from user to host).

The preceding modes and protocols dictate the choice of modem as well as the RS232 hardware and comms software. An additional factor which only influences the choice of RS232 and software is the data word type or 'character framing'. This means how many bits of data (usually 7 or 8), the presence and type of parity (an extra bit used for error checking), and the number of stop bits (normally 1 or 2) indicating the end of a character.

For conversation between computer users the range of options is varied. You may communicate simplex or half duplex, and normally equal baud rates are used. Full duplex is out unless one of you is a designated host, as only one of you can echo back simultaneously, or the channel becomes confused. Note that you can take turns at being host and use full

duplex with its error checking advantages, but this is not a very common mode of operation.

Database communication (Telecom Gold, etc) from hosts which send continuous (scrolling) data is normally performed full duplex with the database acting as host.

There is frequently a choice of baud rates by phoning in on different lines. On Gold, for example, the phone number is the baud rate. There are distinct advantages in working differential baud rates. You'll see them when you get your phone bill. At 1200/75, the relatively small amount of answers to prompts are sent by you at 75 baud for reliability, and the mass of data (often several Kbytes) comes back at 1200 baud. This is four times as fast as at 300/300.

Communication with Prestel and similar frame or page organised hosts like Micronet does not look to me very likely to be possible on the Atom. The problem of incompatibility of screen format and protocol seems too big to solve easily. An example of the problem is the difference between the bit organisation of Atom and Prestel chunky graphics. Remember that you don't have very long to manipulate an incoming character. At 1200 baud you have a maximum 8.3 milliseconds between characters, including the synchronisation time to find the next character.

None of these modem/telephone communications systems use the hardware handshake lines which are standard on hard wired serial interfaces between terminals and computers. Most really cheap modems have only receive data and transmit data lines to the RS232 hardware, but some of them (and all the better ones) have a carrier detect, which should be coupled to the CTS (clear to send) control line of your transmit channel. This ensures that if the line drops out, causing the call to clear down, you will be prevented from further transmission.

The full duplex method of control is XOFF/XON. These are two control codes reserved for channel control, and they work rather like $3 and $2 on the printer channel. The crucial difference is that when either end of a duplex link sends an XOFF, several more characters can be transmitted before the XOFF takes effect due to the time to receive, decode and act on the XOFF. All software should allow for this over-run. On Telecom Gold it is typically 50 milliseconds regardless of baud rate. The expected number of characters is easily calculated.

A typically Atom (probably Dragon as well) problem is that it is impossible to use the standard scrolling screen as a display from the receive channel. This is because every time it scrolls it not only copies 512 bytes backwards in memory, which takes quite a time, but waits until flyback before doing it (which takes even longer). The resultant delay means characters will be lost every time the screen scrolls. The answer to this is a screen driver which returns to top left every time the screen is full, overwriting the oldest data on screen.

This is not the nuisance it might seem. I have run a set of experiments and found that few of my human guinea-pigs can keep up with running text at 300 baud, and none of them could keep up with 1200 baud. The only time the screen is useful is when it is stationary. This means either just after a prompt for input, or during the full duplex echo back of your reply to the prompt. Otherwise it is really an indication of 'system healthy', bearing in mind that even on scrolling databases, the data are normally organised in blocks of 80 × 24 characters (about three and a half Atom screens). An optional solution to this is to cause an XOFF to be sent just before the end of each Atom screen. At a slight penalty on your phone bill, this will allow you to read each roughly quarter page as it arrives.

Anyway it is frequently cheaper to log on to a database, pull a level of search, log off, look at it and decide what to ask for next before logging on again. It is amazing how long it can take to make these decisions when you get beyond the first two or three levels of search, and time on line costs money. We are thus more often talking of saving an incoming session in RAM for later examination than of using screen data at more than a very superficial level.

I have come up with some hardware and software which conforms to these recommendations and can log on to Distel and Telecom Gold storing data in an Editor file. I hope to issue a design manual in the near future.

£5 EDITOR CONTROL CODE PATCH

John Foreman from Lancashire has sent me a note about the Editor control code patch published in Atom Forum, August 1984. In order to get it to work, the entry address on line 130 should be #A027.

The patch will, of course, spoil justification and word/line counting, but it allows the use of Epson fancies in the middle of lines. 'Why don't they build it into the Editor? you ask. Because there's no more room. Thanks for checking this, John – we're sending you £5.

INTERESTING INTELGRAPH

From John Ferguson of Danbury, Essex, comes an interesting note on the Intelgraph Video Board. This is an 80 column (max) private memory VDU controller which can be driven rather like a printer down a serial data channel or mapped into a two byte space on the expansion bus. John writes. . .

The Intelgraph is marketed as a PCB and operating system ROM by the Microtan User Group for use with the Microtan computer, but I have successfully built and interfaced the board to the Atom. It has a display capable of 80 x 25 lines text and high resolution graphics of 512 x 256 pixels. It provides a very fast clean display of graphics, using its own on-board 6502A with 8k OS. Intelgraph is a high quality PCB which can be interfaced as a memory mapped parallel port. . .

I have looked at the data myself, and, with certain reservations, I can recommend Atom users to investigate it. The reservations are, first, its design is already several years old, so it is bulkier and more costly to build than it might be. (It uses 16k of 6116 2k memory, which are now more than half the price of 8k 6264 chips.)

Secondly, the board is about 7in square, which makes protection and installation less than convenient, as most boxes of this size are much taller than needed. Thirdly, some of the control codes required by Intelgraph conflict with Atom codes.

Considerable care will have to be taken if Intelgraph is to run with rational expansion (via, for example, a Bear Hardware subtrack interface), due to the physical size and the mapping decided upon by John in his implementation.

Notwithstanding these provisos, I think Intelgraph could be quite an interesting add-on, but if you are going ahead with it, make sure that your mechanical fixtures and connectors are sound. Surprisingly, the weakest link in most failure-prone microelectronics is mechancial interface at plugs and sockets.

I think Intelgraph should ideally be considered as an additional rather than a sole VDU, and as such, someone might like to think of driving it from a serial port.

Information on John's implementation and driver software can be obtained from him at 5 Butts Lane, Danbury, Chelmsford CM3 4NP. The address of the Microtan User Group is c/o Brian Gibbs, 48 Brightstowe Road, Burnham-on-sea, Somerset TA8 2HP.

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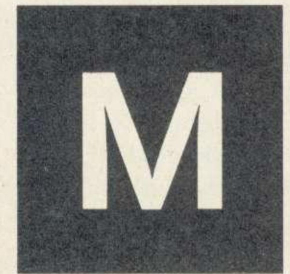
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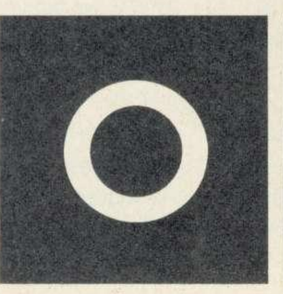
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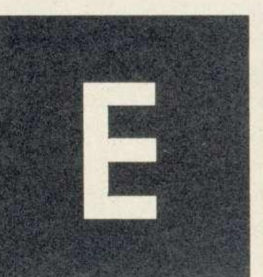
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The definitive disc drive discussion: see page 185

GUIDE TO BUSINESS

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Main menu
Word Processor
Database
Spreadsheet
Graphics
Communications
Label Printer
Exit Mini Office II
Use cursor keys to choose then press RETURN
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Mini Office II Graphics
Graphics menu
Bar chart
Line graph
Pie chart
Load data
Save data
Edit data
Clear data
Select Mouse
Review data
Catalogue
Mini Office II Menu
Use cursor keys to choose then press RETURN
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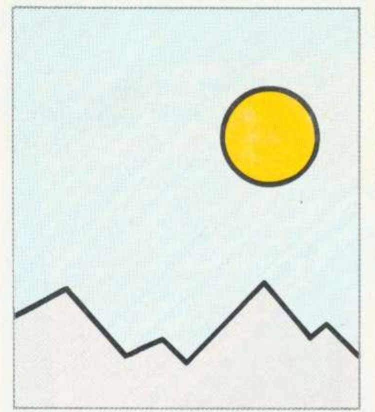
It's a comms pack . . .

Mini Office II Communications
Communications menu
MicroLink/T.Gold (1200/75)
MicroLink/T.Gold (300/300)
MicroLink/T.Gold (1200/1200)
Customised protocols
Select Mouse
Mini Office II Menu
Use cursor keys to choose then press RETURN
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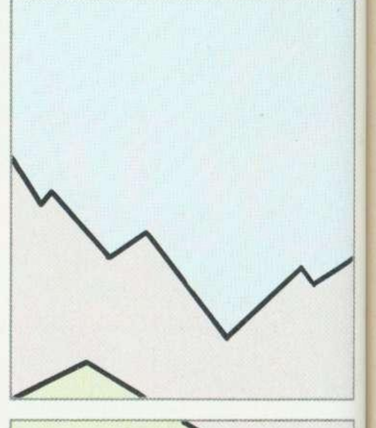
It's a label printer . . .

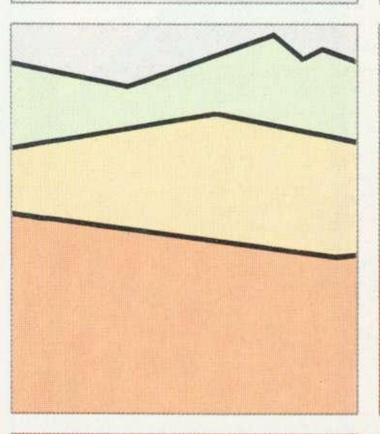
Mini Office II Label Printer
Label Printer menu
Load file
Append file
Catalogue
Edit format
Load format
Save format
Print labels
Storage media........Disc
Select Mouse
Mini Office II Menu
Use cursor keys to choose then press RETURN
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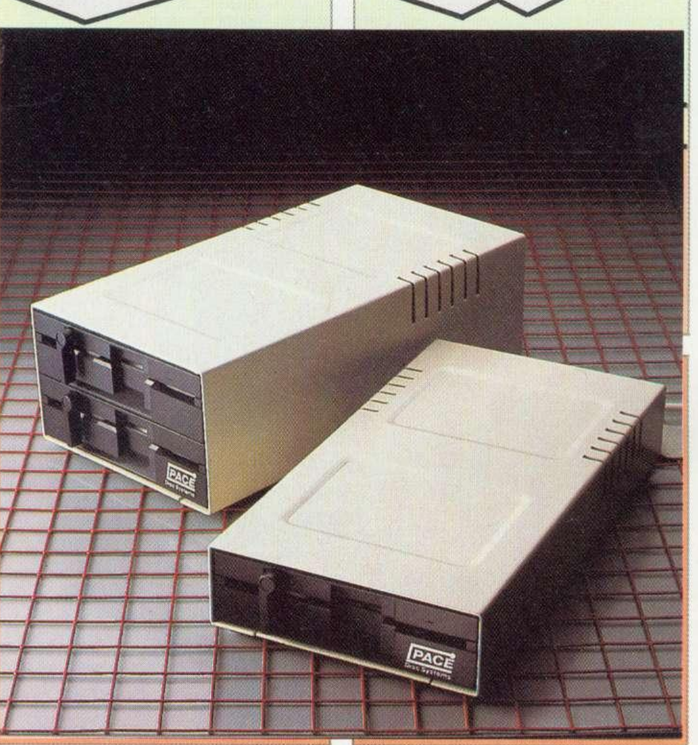
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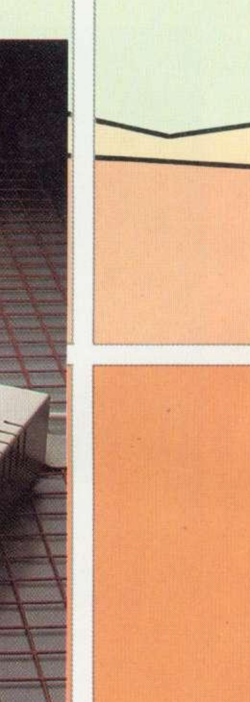


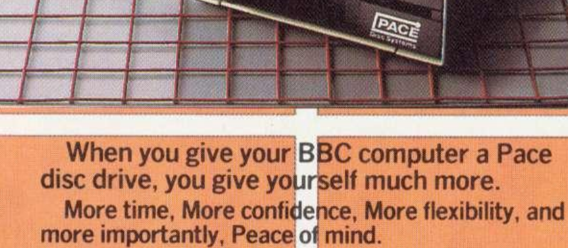












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BUSINESS

NEWS

Database pack from Minerva

System Delta is a database from Minerva Systems, which can be tailored to meet specific business applications. There's also a ready-made card index program.

The package comes as a 16k utilities ROM, offering over 30 commands, and which can refer to six different files (disc only) at the same time.

The basic package costs £54.95 for the ROM chip, a card index program and support. This allows up to 8000 records to be processed with up to 250 fields per record and a variety of search, calculation and layout features. For an extra £19.95 an advanced programming guide allows you to develop your own applications.

Further details from Minerva Systems on (0392) 37756.

A print Plus

Fontwise gives *Wordwise* and *Wordwise Plus* users a range of print styles, ideal for enhancing the appearance of business letters. It even offers microspacing.

The utility costs just £12 and is designed to work with Epson graphics-compatible printers and *Wordwise* or straight ACSII files. A *View* version is promised.

Contact Clares Micro Supplies, 98 Middlewich Rd, Rudheath, Northwich, Cheshire CW9 7DA.

Contex update

Contex Computing has updated its *Bank Manager* software for the BBC micro.

Version 1.4 adds automatic date sequencing, transfer postings and two more 'exec' file commands.

The price is still £17.50 and owners of the previous release can update for £3.50. Contact Contex Computing, 15 Woodlands Close, Cople, Bedford MK44 3UE.

Add-on market hots up

by Geoff Nairn

The market for processor add-ons for the Beeb hots up this month with the release of two rival systems based on the 32-bit 68000 chip. Chameleon Computers has plumped for the GEM operating system for its Whiteboard, which has a 68000 processor and 512k of memory.

Cumana has gone down a different path and is releasing its Upgrade board with the OS-9 operating system, 512k of memory and the 68008 chip.

GEM offers a sophisticated 'user environment' with desk-top icons and pull-down windows and it allows the growing range of GEM software to be run (including the languages C, Pascal and Basic), and accounting, word-processor and spreadsheet packages as well as assemblers.

OS-9 is similar to the multi-user mainframe Unix operating system and it is compatible with Unix software at the C assembler level.

Cumana has chosen to bundle the Upgrade with software comprising Pascal, assembler, Basic and C languages, as well as three applications products – word-processor, spreadsheet and database. Upgrade also has a GEM-like graphics 'front-end'.

Chameleon Computers stresses the range of software which will run on the Whiteboard. Over two thirds of software written for the Atari 520ST machine is claimed to work and there are similar plans for Apple Macintosh compatibility. Software written under GEM for the IBM can be ported across to the Whiteboard.

The GEM operating system: as seen on Acorn's ill-fated ABC 210

Neither board is a second processor, as the 68000 is plugged directly into the Beeb's processor socket – in place of the 6502.

The Whiteboard can emulate a standard BBC micro with the bonus of a Mode X, which uses all 32k of standard Beeb RAM for screen display and offers 640 by 400 pixels.

John Adams of Chameleon Computers claimed that the Whiteboard ran faster than other BBC micro 16/32 bit systems which use second processors. The ill-fated Acorn ABC 210 used the Intel chip and offered GEM.

The price of the Whiteboard has yet to be fixed but should be £400 to £500. Cumana's Upgrade costs £695.

For further details contact Chameleon Computers, Snowdrift House, Bolton Street, Salford M3 5FP. Cumana, Pines Trading Estate Broad St, Guildford, Surrey GU3 3BH.

BUSINESS TOP FIVE

	Title	Publisher	Cassette	Disc	ROM	Electron	Shadow on B+	6502	Econet
1	Mini Office	Database	£5.95	£7.95	—	Yes	Yes*	—	—
2	View 3	Acornsoft	—	—	£89.70	Yes	Yes	Yes	Yes
3	View 2	Acornsoft	—	—	£59.80	Yes	Yes	Yes	Yes
4	Mailing List	Gemini	£19.95	£23.95(40)	—	Yes	—	—	—
				£24.95(80)	—	Yes	—	—	—
5	Pitman Typing	Pitmansoft	£8.65†	£13.00†	—	£8.65†	—	—	—

Compiled by Gallup from a panel of specialist dealers. Contact publisher: Database, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY, 061-480 0171; Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD, (0223) 214411; Gemini Marketing, Gemini House, Concorde Road, Exmouth, Devon EX8 4RS, (0395) 265165; Pitmansoft, 128 Long Acre, London WC2E 9AN, 01-379 7383.

† 3 inch disc


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BUSINESS

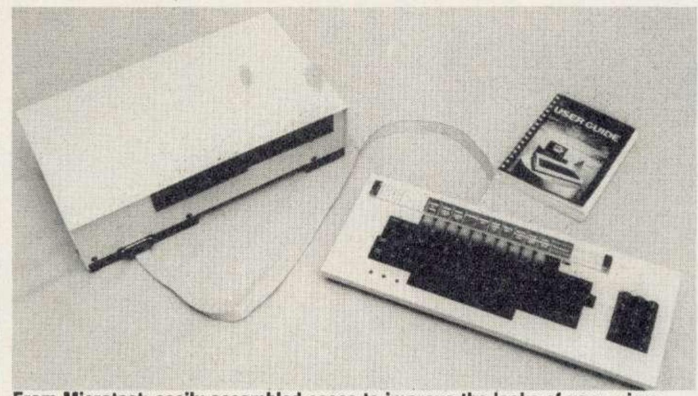
NEWS

Buffer by Gram

Gram Business Systems has produced a printer buffer which will work with the Epson FX and LX range.

Flexibuffer costs £110.50 for an 8k version and £173 for 128k of buffer space. The board sits inside the case of the Epson printer.

Contact Gram Business Systems, 48 Hedley St, Maidstone, Kent ME14 5AD.



From Microtest: easily assembled cases to improve the looks of your micro

New casings for an old Beeb

B-Case is a range of casings designed to give the Beeb the looks of an office computer.

The CPU Housing will take the Beeb's main circuit board, a power supply – either the standard Acorn one or a heavy duty version (price £99.95), and two half height disc drives. Price is £53.

The keyboard case will accept all issues of the Beeb keyboard and allows the Break key to be disabled. Price is £32, or £44 for a case with a built-in numeric keypad.

Both cases can be assembled with just a screwdriver, though the numeric keypad option does require soldering to the main keyboard PCB. Carriage is £4 for either keyboard or CPU case, or £6 for both.

Further details from Microtest Ltd, 18 Normandy Way, Bodmin, Cornwall, PL31 1EX.

Advertising database on line

Magic is an online database for advertising agencies and marketing professionals – and at £1 a minute few others will be able to afford it.

Produced by Thorn EMI's Datasolve division, Magic offers online access to the full text of eight publications, including *Campaign, Marketing* and the advertisers' bible – *Brad.*

The minimum subscription costs £200 a year, which includes 120 minutes of free time; after which the service costs £1 a minute – plus phone charges.

Two specialist databases have been launched by Datasolve's rival, Pergamon Infoline. Planex is aimed at planners and local authorities and contains over 7,500 records on planning law, transport planning and housing.

BSI Standardline holds details of over 150,000 British Standards Institute standards.

Both cost £40 per hour, plus up to 15 pence per record.

Contact: Datasolve Limited, Grosvenor House, Sunbury-on-Thames, Middlesex, TW16 6SB.

Pergamon Infoline, 12 Vandy Street, London, EC2A 2DE.

MALLARD BASIC

ACORN USER OFFER

Half price Mallard Z80 Basic

Users of Professional Basic with the BBC Z80 second processor from Acorn can now upgrade to the full BBC Z80 version of Mallard Basic from Locomotive Software for just £50 plus VAT, against the normal price of £100.

Mallard is the full specification version of the cut-down Professional Basic. The extra features included are:

*editor for preparing
*direct mode commands such as RENUM and MERGE
*tracing facilities for debugging
*extra commands not in Professional Basic
*new 400-page manual with all commands covered in detail: a section on JETSAM keyed file handling and a full tutorial on writing Mallard Basic.

To take advantage of this offer, fill in the coupon and send it with a cheque for £57.50 (inc.) made out to Locomotive Systems, to: Mallard Upgrade, *Acorn User,* Redwood Publishing, 68 Long Acre, London WC2E 9JH.

The Mallard pack contains a Mallard Basic disc (80-track BBC format) and the new manual.

Orders must be received by February 4, 1986.



To: Mallard Upgrade, *Acorn User*, Redwood Publishing, 68 Long Acre, London WC2E 9JH. Please send me. . . . . . .copy(ies) of the full specification Mallard Basic for £57.50 each (inclusive). I enclose a cheque for £. . . . . . .made payable to Locomotive Systems Ltd.

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Offer closes February 4, 1986. HA11



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Yes, at an amazing mail order price of just £499 inc VAT, the TORCH Graduate will upgrade your BBC Model B to a powerful 16-bit business computer.

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Disc and hardware compatible with the IBM PC, the Graduate's MS-DOS operating system allows the exploration of the massive range of IBM compatible business software, programming aids, compilers and languages universally available from all major software houses.

What the press say

"Just by one simple connection the Graduate transforms the BBC into an IBM compatible with sufficient professional computing power to assist in all aspects of a business"

"The TORCH Graduate represents what most people would probably regard as the 'Ultimate Upgrade' for the BBC Micro"

"For comparison, an IBM PC with 256K of RAM, a parallel printer port and a colour card, two 5¼" disc drives of 360K each plus the keyboard, would cost £2,680"

"As an upgrade path for the BBC Micro, the Graduate makes a lot more sense"

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- 2 IBM®PC compatible expansion slots
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- Software compatibility allows Lotus 1-2-3™, Framework™, dBASE III™ and most popular IBM business programs to run without modification, subject to constraints of BBC keyboard and display
- Acorn Disc interface is not required
- Keyboard, text and graphics by BBC Model B Micro·

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BUSINESS

ON TO THE DATA

Many extras can be added to a computer system – as and when there's a need for them. In this final article of the series, we track down what's available

Roger Carus

Once you have your BBC micro with disc drives, wordprocessor and a printer, you begin to face the really difficult decisions about what else to get. It is tempting to add much more to the system – but beware!

In your enthusiasm you may easily forget that the primary purpose of your business is making more money. If you're not careful you will find yourself spending more time on computing than on the parts of your work which directly produce an income.

If you have clearly defined needs that call for the other facilities, then by all means get what is necessary, and it is to alert you to the possibilities that this article is devoted. If you do not have such needs then it really is better to wait until they become obvious.

One small problem that will face you is the choice of software which links to other types, and whether to get 'integrated' packages which transfer information from one to another, or 'dedicated' systems which only do one job. For example, your wordprocessor can retain lists of telephone numbers and print them out in neat two-column formats; you can use a database such as is described below to achieve the same result; or you can get a special mailing list program with a facility for telephone numbers which does nothing else.

Which should you use? If you use more than one, that probably means typing in the data again, which is time consuming, but if you set up your wordprocessor to draw on the database you must master a technique which, though not difficult, takes time and thought.

Databases

If you keep lists of any kind which need to be changed or sorted alphabetically, numerically or in date order then you probably need some kind of database.

Some examples of these may prompt your memory. Names, addresses and telephone numbers of suppliers or customers; price lists; or specifications of equipment. In each of these cases there are likely to be frequent alterations when a client moves or a new product is handled. You may want to present the information in different ways: as an alphabetical telephone list of trading partners; as a sheet of adhesive labels to send letters to all customers in London who sell paint – and so on.

Such programs also have the ability to do calculations and produce some statistical information (eg, how many widgets you have sold to Mr Smith, and what he paid for them). They can also identify sub-groups (for instance, produce a list of the electrical shops you deal with in Manchester). For all of these applications, a database program is ideal, and once obtained can be used for many purposes.

It is less easy to decide which one you should choose, and it very much depends on your precise needs: I would suggest you go for the easiest to set up and operate.

In the last two years I have used three different systems: a very simple disc or cassette based program (Gemini *Database*) which works well but has severe limitations; a much more sophisticated disc system which works beautifully (Beebugsoft's *Masterfile II*) and an expensive ROM system (Mertec's *Database*) which seems to demand extensive programming knowledge to get anything out of it, and so far I have failed, though I know it works. The point about this is that the 'best' system would probably take up too much time for the business user.

In making your choice I suggest you first estimate the probable size of any list you produce: any database will take at least 500 names and addresses on a single disc, which should be enough.

Second, consider how much sorting you do, because some databases are quite slow and you may not have enough uses to justify learning a complicated system. You can also read the comparative review of several by Vincent Fojut, *AU*, December 1984. There have been several improvements to these programs since that time and there are a number of new ones on the market including the new Gemini *Datagem* and Acornsoft's *ViewStore*.

Accounting packages

Most businesses have to keep financial records, if only to satisfy the tax laws, and there are a wide variety of programs to help with this task. They range from day books (or cash books) to record individual transactions in the order they arise, to the preparation and production of invoices and statements of account, stock control, sales and purchasing, inventories, tax returns and draft balance sheets.

There are several payroll programs which not only calculate monthly and weekly wages but also do pension calculations and format the payslips. These all work, although some are easier to operate than others, and the main limitation is the scale which the BBC micro can cope with. It is impossible to generalise about this problem, but few could manage 300 customers each making 20 transactions or 1000 stock lines.

There have been numerous reviews in *Acorn User* but the number and variety of such programs makes comparisons very difficult: this is a supreme example of where you must write down your needs and insist that the supplier confirms that the product can meet them before you buy anything.

Spreadsheets

Not everyone needs a spreadsheet program and for many it will be unnecessary. It is useful to be able to produce calculations, draw up budgets using your own format and then print them, in just the way that managers often find themselves adjusting inter-related figures in large tabulations to arrive at a satisfactory set before publishing them.

No mathematical knowledge is needed, although they do require close attention to their instructions for use.

You will know whether you often have to produce tables of inter-related figures. A simple example in business is a price list where you might have 50 items each with a wholesale price, minimum number supplied, cost of the unit delivered, suggested mark-up, VAT and recommended retail price.

That would involve you in six figures which could change and five calculations every time the wholesale price alters, as well as re-typing the whole list.

If the manufacturer changes his entire list of wholesale prices, you have 250 calculations to

do and a new price list to type and perhaps print: most spreadsheets could do all the calculations and print the table ready for photocopying in half an hour. Similarly they can produce conversion charts for any special purpose quite easily.

If you want more information about them, you may like to read my own comparative review of three very different ones (*Acorn User*, February 1985). Since that time several new and excellent spreadsheets have been published (particularly *Inter-Sheet* from Computer Concepts).

I am more convinced than ever that ROM based systems are better, quicker and easier to learn, although they are rather expensive. I still like *ViewSheet* because of its link with *View* and *View Store*, but *Inter-Sheet* looks very competitive and the related *Inter-Chart* for graphs and charts could give it the edge. *Ultracalc 2* from BBCSoft still has much to recommend it but is better for mathematical uses than for business. See page 137 for an example of a spreadsheet in action.

Statistical packages

There are few of these, they have not been widely reviewed, and databases or spreadsheets can meet most of the needs of small businesses for such purposes.

Nevertheless, statistical packages are important and may be just what you need, not only to produce graphs and charts of almost any kind, but also to perform quite advanced statistical calculations. If you have a use for such a program you are likely to be well aware of it and should look for one which meets your needs: the only comprehensive one I have seen so far is the *Unistat* statistical package from Unisoft Ltd.

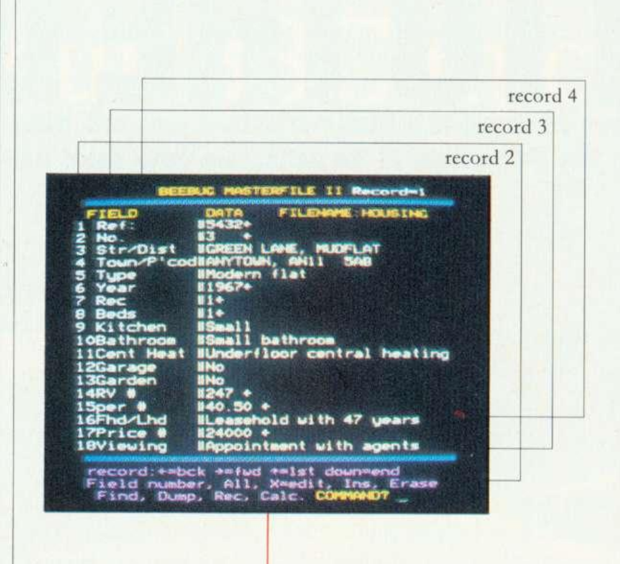
Acorn User will be carrying a comparative review of several statistical packages within the next few months.

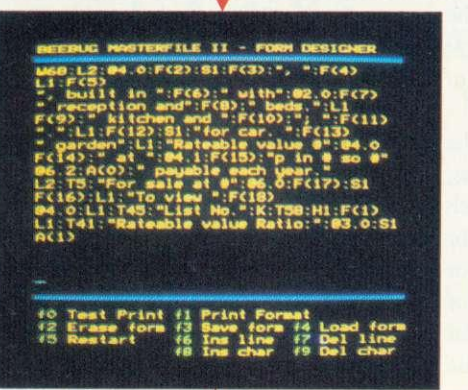
Special programs

The ever increasing range of programs available for special purposes is quite impossible to classify, and you are most likely to have heard of them from others in the same line of business. Broadly they divide into those which meet general needs common to several occupations and specialist functions for individual requirements.

General needs are those such as staff records – and incidentally these need careful thought because there is a legal obligation to register and make known any such private information to the employees concerned under the Data Protection Act (1984).

A useful guide to the Act is available free

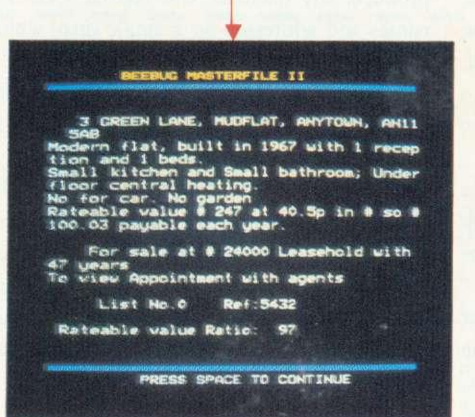





```
Form Design Routine - File Z.HOUSING
-------------------------------------

W68:L2:@4.0:F(2):S1:F(3):", ":F(4)
L1:F(5)
```

The commands used by the form designer decode as follows: W68 means that the width of the final printout to be 68 characters. L2 means start the next line 2 lines down. @4.0 means that the number to be processed will have four integers and no demical places. F(2) means print field 2 (see the top screen). Sl means print one space. F(3) means print field 3. ", " prints a comma. F(4) prints field 4. L1 means start on the next line. F(5) prints field 5, and so on. . .



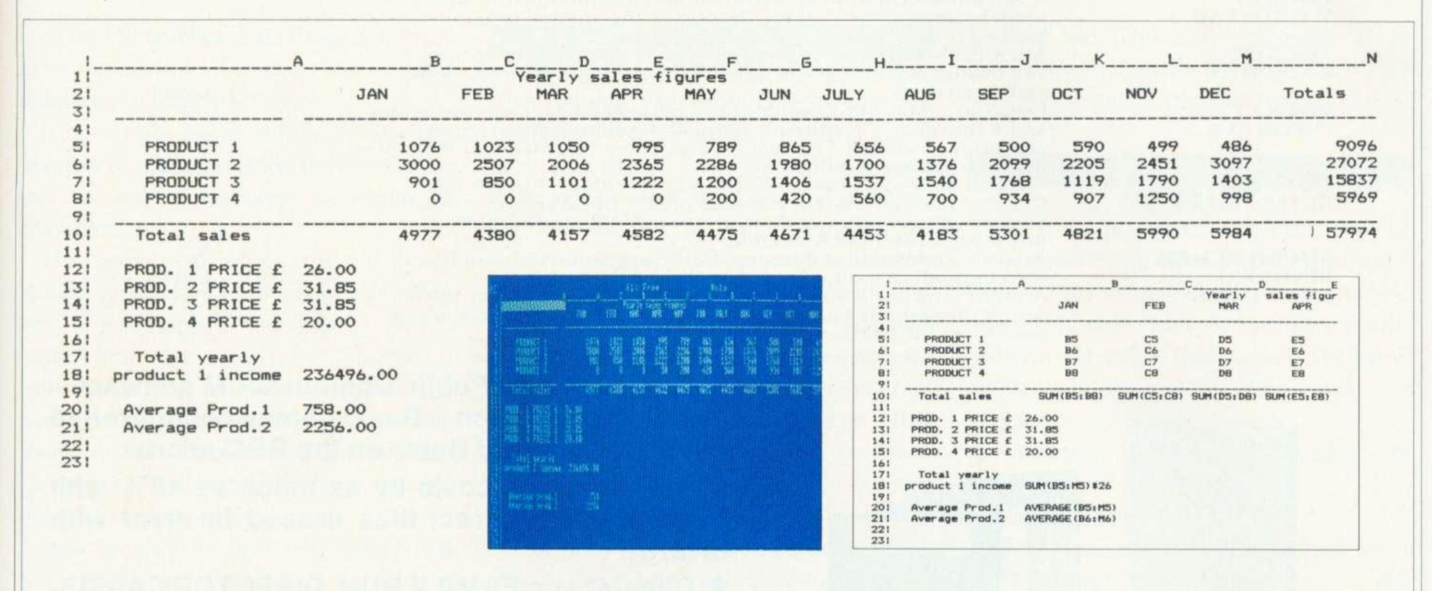
The top screen in this database illustration shows one record. This particular record is part of a file called 'Housing', and is just one of many similar records.

The middle screen shows the 'form designer', which allows you to specify how you want the information from the record to be presented (see the notes above for more details of commands available).

The bottom screen shows the result of running the record through the form designer. It would, in this example, now be ready to print out and send to prospective house buyers.

While individual databases vary in the way this process is carried out, the general principle remains the same.

See the 'database for estate agents' panel on page 139.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1				Yearly sales figures										
2		JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	Totals
3														
4														
5	PRODUCT 1	1076	1023	1050	995	789	865	656	567	500	590	499	486	9096
6	PRODUCT 2	3000	2507	2006	2365	2286	1980	1700	1376	2099	2205	2451	3097	27072
7	PRODUCT 3	901	850	1101	1222	1200	1406	1537	1540	1768	1119	1790	1403	15837
8	PRODUCT 4	0	0	0	0	200	420	560	700	934	907	1250	998	5969
9														
10	Total sales	4977	4380	4157	4582	4475	4671	4453	4183	5301	4821	5990	5984	57974
11														
12	PROD. 1 PRICE £	26.00												
13	PROD. 2 PRICE £	31.85												
14	PROD. 3 PRICE £	31.85												
15	PROD. 4 PRICE £	20.00												
16														
17	Total yearly													
18	product 1 income	236496.00												
19														
20	Average Prod.1	758.00												
21	Average Prod.2	2256.00												
22														
23														

	A	B	C	D	E
1				Yearly	sales figur
2		JAN	FEB	MAR	APR
3					
4					
5	PRODUCT 1	B5	C5	D5	E5
6	PRODUCT 2	B6	C6	D6	E6
7	PRODUCT 3	B7	C7	D7	E7
8	PRODUCT 4	B8	C8	D8	E8
9					
10	Total sales	SUM(B5:B8)	SUM(C5:C8)	SUM(D5:D8)	SUM(E5:E8)
11					
12	PROD. 1 PRICE £	26.00			
13	PROD. 2 PRICE £	31.85			
14	PROD. 3 PRICE £	31.85			
15	PROD. 4 PRICE £	20.00			
16					
17	Total yearly				
18	product 1 income	SUM(B5:M5)*26			
19					
20	Average Prod.1	AVERAGE(B5:M5)			
21	Average Prod.2	AVERAGE(B6:M6)			
22					
23					

Figure 1. This main picture is of a typical spreadsheet, in this case Computer Concepts' *Inter-Sheet*. Figure 2 (inset screen dump) is a 'doctored' spreadsheet displaying formulas. Figure 3, the screenshot, shows the cursor in box A1

In non computing terms a spreadsheet is simply a large piece of paper that is divided into rows and columns. The columns are headed with letters, ie, the first column is column A, the second column is B and so forth. Rows are numbers, starting from 1.

Any point on the spreadsheet can be referenced simply by giving the column and row it appears in, in that order. Thus the very first point, or box, is in column A and row 1, or A1. Conversely, B7 would be the box situated at the junction of column B and row 7.

Screen windows

Because the computer can display only a relatively small amount of information at any one time and because of the large overall sizes of spreadsheets, you can view only a small section of it at any one time. The screen, therefore, is effectively a small window on to the whole of the spreadsheet – however, the window can be moved all over the spreadsheet as required. It's similar to looking down a cardboard tube onto a large book. The tube restricts your view of the page but all of the page can be viewed by moving the tube along and down the page as required. Figure 1 shows a typical spreadsheet, using Computer Concepts' friendly *Inter-Sheet*. The columns and rows can be seen quite clearly. There are headings for columns and rows and the boxes are filled with numeric data.

Calculations

The joy of the computer spreadsheet is that it can be programmed to do calculations for you. For example, look at column B which is headed JAN and gives sales for 4 products. These are entered in boxes B5, B6, B7 and B8. Row 10 holds the total sales for each month, while B10 supplies the total sales for JAN.

Formulas

Rather than add these up and enter the total we can program the spreadsheet to do it for us. To do so we must enter a formula, which is not as awful as it sounds. Think of what we need to find the sum total of boxes B5 to B8 – B5+B6+B7+B8. However, a simpler way is to use a summing command provided – SUM. In brackets and separated by a colon, it must be followed by the start and end boxes of the column (or row) to be summed. In this case the formula is:

SUM(B5:B8)

To enter a formula just move the cursor (the white bar in box A1 in the photograph, figure 3) to the box in question and type it in!

As this is done the boxes referenced will be summed and the total displayed in box B10. Although we cannot see the formula in the box (it's result is displayed, though), it's still there. Thus any alterations we make to the values in boxes B5 to B8 will be taken into account and the total in B10 updated. For example, moving the cursor to box B8 and typing 100 would enter this into that box (overwriting the 0) and the total would be updated to 5077 instantly. Figure 2 shows a spreadsheet that has been doctored to display formulas in boxes and box numbers where a formula does not actually exist.

The spreadsheet program is intelligent and can distinguish between actual number data and formula and keep the two quite separate. Only number data can be displayed on the spreadsheet, the formulas for each box being remembered. We can find out what formula is in a box by listing them all (using the command projected) or by moving the cursor to the relevant box.

Once here, the formula will be displayed on a special information line at the top of the screen.

Entering text

Entering text such as headings is straightforward. Just type a double quote before the text and press the Return key when you have finished; ie, to place JAN in box B2 the cursor was moved to box B2 and "JAN <Return> typed.

Of course spreadsheets have a whole variety of commands that can be used. For example, rows 20 and 21 contain the average sales for products 1 and 2. One way to calculate this would be to sum the sales for the twelve months for the relative products and divide by 12. The formula for this for product 1 would be:

SUM(B5:M5)/12

ie, SUM boxes from B5 to M5 and divide by 12. However, an AVERAGE command is provided and this simply becomes:

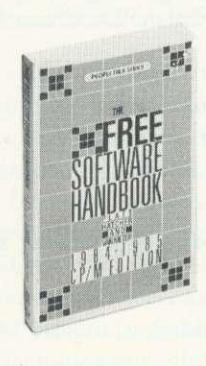
AVERAGE(B5:M5)

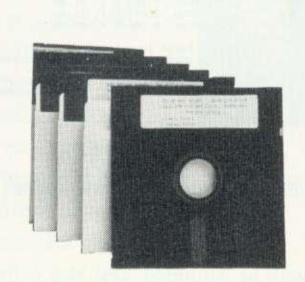
Note that any changes made to product 1 sales, for example altering the contents of box C5, would not only cause the total sales to be recalculated but also this average. In fact any reference to values in row 5 would be recalculated wherever the spreadsheet happens to come across it.

We have just touched on a small number of possible operations. If you want more information, look out for the forthcoming reviews of spreadsheets or buy a copy of Simon Williams' book (*The BBC Micro and the Small Business* published by the BBC at £5.95) which explains the subject in more detail as well as looking at several commercial packages.

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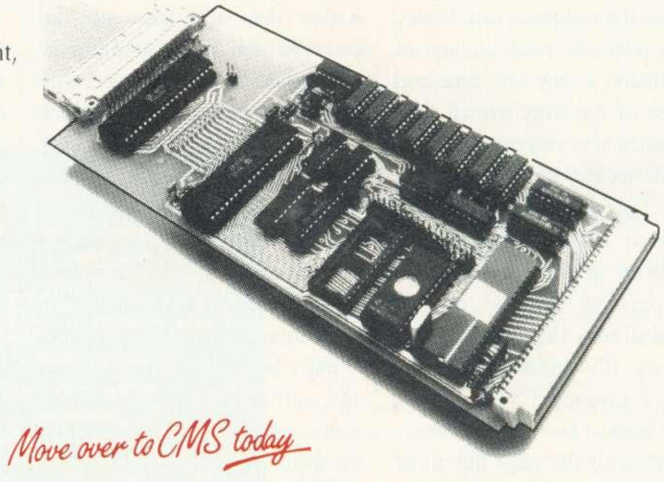
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AA14

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It is, though, useful to have a convenient record of factual information about employees and the many details which are needed for official returns.

The special needs of occupational groups include bookmakers (calculating and settling bets), caterers (menus and costing), doctors (patient lists – but watch for confidentiality), farmers' accounts, newsagents (round lists, summaries of papers required and monthly accounts) and pharmacists (label printing). This is just a small sample of what is available, and there are many others.

Some programs are interesting but it is hard to see a commercial application for them, or their capabilities are insufficient for most business use.

On the whole I am not convinced that the computer aided design packages, of which there are several, would meet specialist needs. More promising are those which can do schematic drawings, critical path analysis or fulfil the needs of engineers. If you think you could use one of these, they do exist and by all means find them and see if they will help.

Other developing lines spring to mind: already many libraries and supermarkets use bar code readers to read and use stored data and the BBC micro can use these cheaply and well, so it seems likely that their use will spread. If you want to know more about this I suggest you look at the article by George Hill (*AU*, December '84).

There are also ways of saving money through avoiding large current account balances and easy access to banking facilities through the Midland Home Banking scheme, which allows you to operate your bank account with your BBC micro through a modem and the telephone, can be a help here.

Information is available from the electronic Banking Development Unit, Midland Bank plc, 27/32 Poultry, London EC2P 2BX (Tel: 01-606 9911 Ext. 3113).

A similar idea is that of the *Homelink* facility operated by the Nottingham Building Society in conjunction with the Bank of Scotland. Information from Nottingham Building Society, 5/13 Upper Parliament Street, Nottingham NG1 2BX.

These are just a few of the ways in which a BBC micro can be useful in the smaller business and pay for itself over and over again, making you more efficient and letting you devote more of your time to profitable activities. You can be sure that there will be many more ready-made programs in the future.

DATABASE FOR ESTATE AGENTS

The 'Housing' file on page 136 shows how a simple and cheap disc-based database can be used to do a useful job of work. Using a local estate agent's list of properties and constructing a database of its main features, it was simple to create a file of data which could easily be sorted and printed in different ways.

The system used was Beebugsoft's *Masterfile II*, and the fields employed were conveniently chosen; four imaginary houses were inserted, although about 288 could be stored on a 100k disc. A form design routine was developed including two calculations, notably the rates which would be paid.

The print routine then produced the four descriptions in a style not much worse than the model, and after a sort into ascending price order a much simpler form design was used to produce the start of a list.

It is also potentially useful to be able to search the list of properties for those which most closely resemble the requirements of the potential buyer, and to adjust this until satisfactory suggestions are made. Both of these could easily be done.

ACORN USER REVIEWS

Databases
StarBase: Ian Rowlings, July 1984, p103
Comparative review: Vincent Fojut, December 1984, pp151-158
Accounting packages
June 1984, pp103-108
September 1984, pp117-118
March 1985, pp133-137
May 1985, p136
Spreadsheets
Comparative review: Roger Carus, February 1985, pp137-142,
May 1985, p135
Bar code readers
George Hill, December 1984, pp65-70

SOFTWARE PUBLISHERS

Acornsoft, c/o Vector Marketing, London Road, Wellingborough, Northants NN8 2RL for *ViewSheet* (£55.20) and *ViewStore* (£59.80)
Beebugsoft, PO Box 109, High Wycombe, Bucks HP10 8NP for *Masterfile II* (£18.98)
Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX, Tel: (0442) 63933 for *Inter-Sheet* (£56.35) and *Inter-Chart* (£36.80)
Mertec (Merlin Computer Products), 33/36 Singleton Street, Swansea SA1 3QN, Tel: (0792) 467980 for the *Merlin Database* (£49.60)
Unisoft Ltd (University Software), 29 St Peter's Street, London N1 8JP, Tel: 01-359 0978 for the *Unistat Statistical Package* (£85)

CHECKLIST

Here's a list of typical tasks that might be encountered in the office. Answer these questions and you will have an idea of whether you need a BBC micro for your business and what software you will be likely to use. The letters on the right give you an idea of what you might need, as follows:
A Accounts packages, **D** Database, **S** Spreadsheet, **W** Wordprocessor.

1 If you buy supplies
- Do you keep records of purchases for
  - costing? **A S**
  - accounts? **A**
  - taxation? **A**
- Do you have an inventory for insurance? **D**
- Do you keep a list of suppliers with their prices? **D W**

2 If you sell things,
- Do you keep a list of customers with contact names, addresses, telephone numbers, what they buy and in what quantities? **D**
- Do you keep a record of sales? **A**
- Do you keep specifications for your stock? **W**
- Do you keep stock records? **A**

3 If you undertake services,
- Have you a customer list? **D W**
- Do you keep a record of the types of work done? **D W**
- Do you record the work you have done for the individual customers? **D**

4 If the business has correspondence,
- Do you write many individual letters? **W**
- Do you write similar letters to many people? **D W**
- Do you have any bulk mailing? **D W**

5 Other written material:
- Advertisements of goods and services for sale **W**
- Price lists **D S W**
- Booklets and brochures **W**
- Quotations for goods or services **D S W**
- Menus or recipes **W**
- Copy for printing **W**
- Reports **D W**
- Invoices and Statements **A**

6 If you have any employees.
- Do you keep staff records? **DW**
- Do you advertise vacancies? **W**
- Do you need job descriptions to send to applicants? **W**
- Do you write references? **W**

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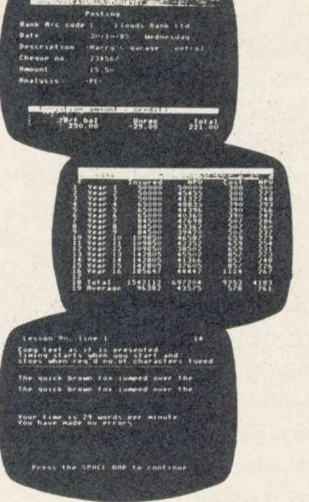
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CP/M CORNER

A PROBLEM SOLVED

In the September issue, I tackled the problem of bad sector errors that were occurring during the use of *MemoPlan*. Bad sector errors are in fact created by CP/M and not *MemoPlan*, and several suggestions were put forward for isolating the problem. Since that issue was published, I have had several letters from other users who are having the same problem. One was from Mr Chijioke, who has found a cure.

When he originally received his BBC with Z80 second processor, bad sector errors were occurring, caused by a chip in the computer which was overloaded. This problem is similar to that which produced random characters on screen and printer when the Z80 is attached. If you suffer from this or any other persistent fault, take your system to an Acorn-approved dealer. He should be able to help you by referring to his customer service dealer information manual. Another cause of problems is a strong magnet somewhere near the disc drives. Remember to keep printers and monitors separate from disc drives – and never rest the printer on top of the disc drives.

I'd like to hear from anyone who has had other problems, whether or not they have been cured. For bear in mind that someone else might be in exactly the same situation.

COLOURED JUDGEMENT

Much as I like to criticise the editor for waving his scissors all over my articles and cutting the best bits out, I must confess to going a bright shade of scarlet when it was pointed out to me that I had got the colour patches wrong in the *MemoPlan* article published in October.

The problem was that, when the instructions given in column three of page 128 with regard to changing colours are followed, the background colour of cyan never changes. The second paragraph of this column should read: 'If you want to use different colours, the bytes at A24H, A2AH, A30H and A36H should be altered to whatever you require. In addition, the screen is now cleared when you leave *MemoPlan*. If you don't want this to happen, change byte A16H to 0.'

The addresses A2FH and A35H were incorrect. These contain the values for the logical colours to use for the background, and the addresses A30H and A36H contain the physical colours to be assigned to the logical colours. The assignment of logical and physical colours is performed using the equivalent of the VDU19 command (19 decimal = 13H). For a description of the VDU 19 command, see pages 378, 382 and 383 of the *BBC User Guide*, and for an explanation of logical and physical colours see pages 56-61, 160-169 and 222-224 of the same publication.

EVERYTHING BUT THE PRINTER SINK

The BBC with Z80 provides several different ways of specifying the printer output or redirection. When using the CP/M, it is best to restrict any redirection to that provided by CP/M – if the *FX commands are used, confusion can quickly arise. The printer type can be set by using the STAT command from the CP/M command line. To select a serial printer, STAT LST: = TTY: should be typed. This will cause all printer output to be directed to the RS423.

This method does not provide the printer sink facility provided by the default option. The command STAT LST: = UL1: will cause all printer output to be directed to the parallel printer without the printer sink facility being enabled. If at any time you want to return to the default setting, then the command STAT LST: = LPT: should be issued. A full explanation of Input and Output redirection is given on pages J-6 and J-7 of the CP/M 2.2 with GSX graphics manual.

FLASH IN THE COMMAND

When using CP/M and typing CTRL S to pause output, it is possible to end up with one or more CTRL S characters left at command level. If Return is typed following these, the screen will start to flash. This is because, at the Console Command Processor (CCP) level, CP/M doesn't recognise CTRL S as a valid character, so ignores it.

However, the characters that are ignored by CP/M are passed straight through to the Machine Operating System (MOS) in the BBC micro. When this happens, CTRL S is taken as a redefine logical colour statement, causing the screen to flash. If this happens, type in CTRL T and the screen will be restored to normal.

MINDS OF THEIR OWN

The vexing problem of installing programs for the BBC microcomputer keeps cropping up in reader correspondence.

The nub of the problem is that, although CP/M is an industry standard operating system, each machine has its own characteristics. This is particularly so as regards the way the screen and, to a certain extent, the way the printer is handled.

A package such as a wordprocessor or spreadsheet has to be installed on the machine on which it is to run.

This involves letting the package have details about the system and how it functions. Most of the software is in Acorn disc format but is not installed for the Z80 second processor. So, when you buy it, stipulate that the package must be installed and ready to run on the Z80 second processor.

THE OLD, OLD STORY

Back somewhere in the mists of time, there was an alternative to the Z80 second processor. I even had one of these mysterious beasts (without the ROM and discs, of course). Then, as time went on, a grain of hope arrived on the horizon: some discs for the beast did appear by GPO camel (but still without the ROM). But fear, not friends – a shining nit came from afar (with ROM) and took away the mysterious beast (leaving the ROM, of course). Amidst curses and screams of rage, a doom-laden bearer of ill tidings carried off the treasured ROM (with discs, of course). All this faded into folklore.

But when the clans gathered again in the high citadel to pay their respects to the Gurus and the High Priests, someone was cooking up the old plot. The beast was stirring, the flame flickering . . . something was about to happen. Now, as the clans settle down to another year of life and prepare for the next gathering, the only reminder I have of the mysterious beast is a faded parchment filled with hieroglyphics and magical incantations: "Support Department", "MC/tjs", "16th August 1985", "next week".

Now, I ask myself – will it work with my new advanced BBC, with this-that-and-the-other fitted?

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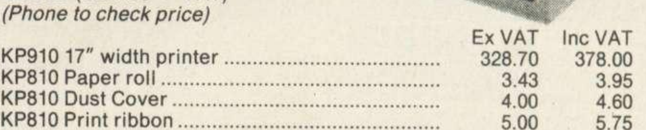
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BUSINESS

CP/M CORNER

PROFESSIONAL APPROACH



The inputting of programs using *MemoPlan* also causes trouble for some people – and this hasn't been helped by me forgetting to include instructions on how to produce the executable file for the INITP program in the October issue. So, to explain how to enter programs using *MemoPlan*, we will go through the operations for the program.

If you want to create programs for Professional Basic, the same sequence is used for entering the programs. They can then be run using PBasic. You will need a disc containing *MemoPlan*, ASM and LOAD. Or you can save the program files on drive B and use ASM and LOAD to assemble and load the files.

Enter *MemoPlan* and use the NEXT (f9) key to find a suitable place to create the program – to do this, you may have to save a document that is already present. Next, use the CLEAR (Shift f9) to clear the document. Now use the P MODE (CTRL f0) to change the input mode to Line – this will cause the word within round brackets at the bottom left of the screen to alter. Once the Line mode is selected, type in the program – remembering to put a RETURN at the end of each line. Once the program has been typed in, save it by using the WRITE (f8) key and entering the filename – in this example, INITP.ASM – in response to the prompt for the filename. Now leave *MemoPlan*, using the FINISH (CTRL f9) key.

Now the program can be assembled. If you are typing in a program for Professional Basic, you can now run the Basic, following it with the filename (eg, PBASIC TESTPROG). To assemble the program, type ASM INITP, which should also report errors. If there are any, go back into *MemoPlan* and correct them. For details of error messages, see section 3 of the CP/M 2.2 manual.

Once you've assembled the file without errors, you will have a file called INITP.HEX. This contains an Intel hex code representation of your program. It can now be converted into a program that will run by typing LOAD INITP, which will result in a file called INITP.COM being on disc. The program can now be run by typing INITP.

For Professional Basic programs, *Nucleus* can be used to create programs. However, these programs can't be edited using *MemoPlan* because they have been created in the internal format of Professional Basic. But it is possible to change this internal format to ASCII, which *can* then be edited using *MemoPlan*. The following example shows how this is achieved. In this case, we have created a file called PARTS using *Nucleus*, which we now want to alter.

First use *MemoPlan* in line mode, as described above, to create the following program:

```
1 CHAIN MERGE
"B:PARTS.BAS",65533
65533 SAVE "NEWPARTS.BAS",A
65534 SYSTEM
```

Now save this program on disc with the name ASCII.BAS. Next, run Professional Basic with the file ASCII (eg, PBASIC ASCII). This will merge the program PARTS into the program ASCII, then continue execution at line 65533, which saves the program as an ASCII file with the name NEWPARTS.BAS, then returns to CP/M. The file can now be edited using *MemoPlan*, then run in the normal way.

Once your alterations have been made and tested, you can return the program to an internal format to save space. This needs another short program as follows:

```
65532 CHAIN MERGE
"NEWPARTS.BAS",65533
65533 SAVE "B:PARTSBAS"
65534 SYSTEM
```

This merges the altered program and saves it in the internal format (there is no ,A following the save). The file could have been protected so that the code could never be examined again, or saved in the ASCII format if required. The file name should be followed by ",P" to do this. Once done, this cannot be undone – so be very careful.

A POCKETFUL OF STAR-MIGHT

Pocket Wordstar is now available for the Z80 second processor. This is a fully functional version of the popular *Wordstar* word processing package which includes the *Mailmerge* facility for producing mailshots or circulars. The whole package costs £119 and comes fully installed and running. Other popular packages, such as *Calcstar*, will soon be added to the Pocket range of products, and I will be reviewing these in due course.

ORDER OF THE BOOT



Valerie Cox has kindly pointed out that the boot program mentioned in the review (*Acorn User* January issue) of Bruce Smith's book, *Introducing CP/M on the BBC micro Z80 second processor*, was written in response to a technical query from a Tubelink reader.

Tubelink can be found on page 258216 of Prestel. They provide telesoftware, and when I looked at this, the boot program was still available.

Z80 FUTURE FEATURES

During the coming months, we will be looking at the utilities supplied with the Z80 second processor and the *FilePlan* and *GraphPlan* packages. If you have any specific points you'd like covered, please let me know.

COMMUNICATIONS BREAKDOWN

Some people who implemented the alterations, published in the August issue, for the communications program *UKM7* have been having difficulty in getting the program to work.

A version of the program that will run on the Z80 second processor is now available from the CP/M Users Group (UK) library, and I'll be checking as soon as possible that this runs correctly.

SOFTWARE SHORTAGE

Readers may have noticed a lack of reviews of software for the Z80 second processor. This is because no software has yet been received, not that such packages are non-existent. In fact, I have yet to find a CP/M package that will *not* run on the Z80.

For hints and tips, help or advice write to Edward Brown, CP/M Corner, Acorn User, 68 Long Acre, London WC2E 9JH

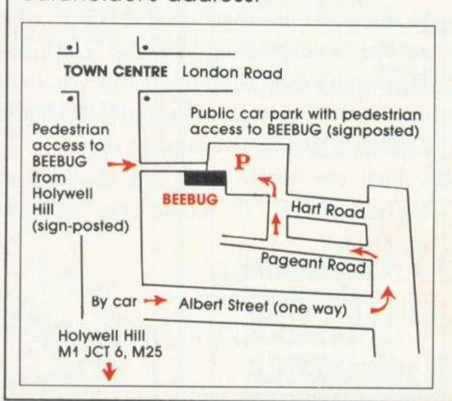
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COMPUTERS

BBC B Plus. There are two versions of this machine, the standard 64K with shadow screen memory at £459, and a 128K model at £489 with a special Basic and 64K user ram available for programs!

Disc Interface Upgrades. The Advanced Disc Filing System (ADFS) is now available, it requires the 1770 disc controller upgrade to be fitted. The ADFS offers some 60% increase in data storage and a large number of files per disc. The 1770 controller has built-in Format and Verify routines so you don't need any special utilities disk.

Second Processors. At £199 the 6502 second processor remains the best way of adding memory, whether it's to preview text in 80 coloumns or increase spreadsheet size. Special disc based versions of Wordwise Plus and Intersheet are available at £6.50 to fully utilise the extra space, although you must have the rom fitted to use them.

Disc Interface Offer. We are proud to be able to continue our very special offer of an Acorn 1.2 DNFS disk interface kit at £89. We are also continuing our offer of the Disk System Starter Pack (1.2 DNFS interface, Cumana 100K Drive, Disc Manual & 10 Beebug Discs) all for just £179.

Code	Description	Price inc. VAT
0202	BBC B Plus Computer	**459.00**
0220	BBC B+ with Econet	**499.00**
0221	BBC B+ 128K	**489.00**
0203	'6502' 2nd Processor	**189.00**
0204	'Z80' 2nd Processor	**389.00**
0205	Acorn Prestel Adaptor	**129.00**
0206	Acorn Teletext Adaptor	**139.00**
0210	A to B Upgrade Kit	**69.00**
0212	Acorn Speech Upgrade	**46.00**
0209	1.2 DNFS Rom	**19.50**
0217	1770 Disc Controller Upgrade Kit	**49.00**
0218	ADFS Rom for 1770 DFS	**29.00**
0213	Watford DFS Rom and Manual	**26.50**
0214	Watford DDFS Rom + Manual	**98.00**
0216	Watford DFS Manual	**6.95**
0219	Watford DFS Kit	**85.00**
0223	Acorn 1.2 DNFS upgrade	**89.00**
0222	Disc System Starter Pack	**179.00**

DISC DRIVES

We can again offer the entire range of Cumana disk drives from stock. The 800k CD800S remains probably the best value drive available and has stood up to tremendous punishment in the Beebug offices.

Code	Description	Price inc. VAT
0600	Cumana 100K CSX100 40T	**97.00**
0610	Cumana 100K CS100 40T	**127.00**
0601	Cumana 200K CDX200 40T	**187.00**
0602	Cumana 400K CSX400 40/80T	**113.00**
0603	Cumana 400K CS400 40/80T	**133.00**
0604	Cumana 800K CD800S 40/80T	**252.00**
0605	Watford 200K CLS200 40T	**97.00**
0606	Watford 400K CLS400S 40/80T	**133.00**
0607	Watford 400K CS400S 40/80T	**149.99**
0608	Watford 800K CD800S 40/80T	**270.00**
0650	Memorex Discs S/S D/D 48TPI 3481	**15.50**
0651	Memorex Discs D/S D/D 96TPI 3501	**25.50**
0652	Memorex Disc Head Cleaning Kit	**9.65**
0653	Library Case — 10 discs	**2.25**
0654	Disc Storage box — 50 discs	**9.00**
0655	Lockable Disc Box (35)	**13.80**
0656	Lockable Disc Box (80)	**17.25**
0657	10× 48TPI SS DD Discs + Free Box	**14.40**
0658	10× 48TPI DS DD Discs + Free Box	**20.00**
0659	10× 96TPI SS DD Discs + Free Box	**20.00**
0660	10× 96TPI DS DD Discs + Free Box	**21.40**
0661	25× 48TPI SS DD Discs + Free Box	**33.90**
0662	25× 48TPI DS DD Discs + Free Box	**45.19**
0663	25× 96TPI SS DD Discs + Free Box	**45.19**
0664	25× 96TPI DS DD Discs + Free Box	**48.90**
0665	50× 48TPI SS DD Discs + Free Box	**58.30**
0666	50× 48TPI DS DD Discs + Free Box	**81.40**
0667	50× 96TPI SS DD Discs + Free Box	**81.40**
0668	50× 96TPI DS DD Discs + Free Box	**92.49**

OTHER HARDWARE

Roms and Rams. The 2762 8k EPROM is still just £2.30, with the 27128 16k version at £3.45. "Shadow" RAM to increase user memory in Modes 0 to 6 can be added with either the Aries B32 RAM Board or the Watford 32K RAM Card, which can live in the machine together with most of the popular ROM expansion boards.

Joysticks. Joysticks are just the thing to make use of the best in Games software and now also increasingly used in more serious applications. The Voltmace 3Bs are popular and robust and the added keypad on the 14b has a host of interesting possibilities.

Code	Description	Price inc. VAT
0700	Aries B20 RAM Card	86.50
0701	Aries B32 RAM Card	91.00
0702	Watford 32K RAM Card	69.00
0703	AMX Mouse	79.95
0704	ATPL Sidewise ROM Board	39.00
0705	2764 8K eprom	2.30
0706	27128 16K eprom	3.45
0707	6264 8K ram	7.50
0708	Eprom Extractor	5.00
0709	Eprom Eraser	32.20
0710	Softlife Eprom Blower	75.90
0711	Nightingale Modem	120.00
0712	Pace Commstar	33.00
0713	Phone 2 into 1 adaptor	6.32
0714	BBkey Function Key Labels	2.00
0717	Watford Sideways ZIF	17.25
0718	Voltmace Delta 3B Single Joystick	11.99
0719	Voltmace Delta 3B Twin Joystick	19.95
0720	Voltmace Delta 14B Joystick/Keypad	14.95
0721	Voltmace Delta 14B/1 Interface	14.85
0722	13 amp 4-way plug block Extension	10.35
0724	Antex CN17 Soldering Iron	6.79
0726	8 way DIP switch	0.98
0727	RS423 domino plug	0.46
0728	RGB 6 pin DIN plug	0.46
0729	Cassette 7 pin DIN plug	0.30
0730	3-core 6 amp Mains Cable (per m)	0.35
0731	4-core RS423 Cable (per m)	0.20
0732	6-core RGB or Cassette Cable (per m)	0.25
0733	Safebloc Test Connector	11.50
0734	BBC Replacement Keyboard	46.00
0735	ATPL Battery Backup kit	17.00

MONITORS

Colour Monitors. Visitors to our showroom have been bowled over by the astonishing resolution and rock-steady image of both graphics and 80 column text of the Sanyo 3115 Ultra High Resolution Colour Monitor. The Philips CT2007 Colour TV + RGB Monitor also offers superb value and can easily resolve 80 column text.

Monochrome Monitors. Our Kaga 1203 Amber Screen Monitor is proving a real winner. Very easy on the eyes, even after many hours use.

Code	Description	Price inc. VAT
0500	Kaga 1201 G Hi-res Green	103.50
0501	Kaga 1202G Ultra Hi-res Green	120.75
0502	Kaga 1203A Ultra Hi-res Amber	120.75
0503	Zenith 123 12" Green	75.90
0530	Microvitec 1431 Med-res Monitor	218.50
0531	Microvitec 1451 Hi-res Monitor	276.00
0532	Philips CT2007 14" TV Monitor	225.00
0533	Sanyo Very Hi-res 14" Monitor 3115	449.00
0550	1.0m Monitor Lead RGB	5.75
0551	1.0m Monitor Lead BNC Zenith/Kaga	3.45
0552	Single Plinth for Monitor/Printer	12.65
0553	Double Plinth for Monitor	21.85
0554	Memorex TV and VDU Cleaning Kit	4.51

SOFTWARE

New BEEBUGSOFT releases. We continue to expand our range of software with our own new version of "Toolkit" and our new "Romit". "Studio 8" is becoming a very popular music processor package and "IconMaster" is intriguing everyone! See our software leaflet for details of these and other releases.

Other New Releases. From AcornSoft we now stock ViewStore, which is rapidly proving a useful database package. The View Printer Driver Generator package replaces the old printer drivers and does a whole lot more. The Graphics Extension ROM, which at last puts all those "unused" PLOT and DRAW commands to spectacular use makes an ideal gift for someone at Xmas or for yourself at any time!

Code	Description	Price inc. VAT
1000	Acornsoft View	53.00
1001	Acornsoft View Sheet	53.00
1019	Acornsoft View Store	53.00
1002	Acornsoft Hi-View	55.00
1003	Acornsoft Lisp Rom	49.00
1004	Acornsoft BCPL	56.00
1005	Acornsoft Comal	49.00
1006	Acornsoft Logo	69.00
1007	Acornsoft ISO Pascal	69.00
1008	Acornsoft Basic Editor	29.00
1009	AMX Desk	21.95
1010	AMX Utilities	13.45
1011	BBCsoft UltraCalc 2	75.00
1012	Acornsoft Elite Disc Version	17.00
1013	View Printer Driver Generator Cassette	9.90
1014	View Printer Driver Generator Disc	11.50
1015	Revs Disc	17.00
1016	Aviator Disc	17.00
1100	Wordwise Plus	52.90
1112	Hi Wordwise Plus Disc	6.50
1102	Wordwise	35.00
1106	Accelerator	58.90
1109	Disc Doctor	28.00
1103	C.C.Graphics ROM	28.00
1110	Intersheet	51.35
1111	Hi Intersheet Disc	6.50
1104	Printmaster (Epson)	28.00
1105	Printmaster (Star)	28.00
1107	C.C.Speech ROM	30.00
1108	Acorn Speech Processor (with 1107)	10.00
1118	White Knight Mk 12 Disc	19.00
1119	White Knight Mk 12 Cassette	9.50
1017	Graphics Extension Rom B	29.00
1018	Graphics Extension Rom B+	29.00
1114	Interchart	29.00

PRINTERS

Letter Quality. The Juki 6100 Daisywheel printer remains super value for applications demanding true letter-quality printing.

Colour Printers. The Canon PJ1080A Full Colour printer continues to amaze even Beebug staff with the brilliance and range of colour it can provide. Our new "Dumpmaster" ROM contains all you need to drive it for suberb colour screen dumps. We also stock the new Epson JX80 Colour Matrix Printer which is also capable of high speed listings.

Plotmate Offer Continues. The Linear Graphics Plotmate continues to be a very popular plotter and we are happy to announce that we can continue to offer this at the very special price of £333.50.

Kaga/Taxan & Canon PW1080A. These printers are proving very popular and we can now offer a package providing virtually instant access to at least EIGHT new NLQ Fonts for these machines. The remarkable FONTAID will be in stock by the first week in December but, at the time of going to press, we don't have firm prices. Please ring us for details.

Printer Accessories. Due to the costs of sending our Printer Paper through the post we must charge a carriage of £2 per box, in addition to normal carriage charges. The price of £14.50 is for single boxes and, as with all our goods, we would be pleased to quote to schools and industry for larger quantities.

Code	Description	Price inc. VAT
0300	Brother HR 15 Daisywheel	373.75
0301	Canon PW1080A 10"	340.00
0302	Canon PW1156A 15"	405.00
0303	Canon PJ1080A colour	460.00
0304	Epson LX 80	270.00
0305	Epson RX 100	392.00
0306	Epson FX 80	362.00
0307	Epson FX 100	490.00
0308	Epson JX 80 colour	569.00
0309	IBICO LTR1 Letter Quality	138.50
0310	Juki 6100 Daisywheel Printer	359.00
0311	Kaga KP 810	263.35
0312	Linear Graphics Plotmate	333.50
0313	LX80 Tractor Feed Unit	23.00
0400	2m Printer Lead	10.00
0401	Platen Cleaner Kit	6.00
0402	Epson FX80/RX80 Ribbon	5.00
0403	Epson FX100/RX100 Ribbon	10.00
0404	Juki 6100 Replacement Daisywheel	20.50
0405	Brother HR-15 Daisywheel	20.50
0406	11"×9.5" P/Paper (2000 sheets)	14.50
0407	3.5"×1.44" Labels (1000 approx)	5.00
0408	Canon PW/Kaga Taxan Ribbon	6.79
0411	HR-15 Correctable Ribbon	4.30
0412	HR-15 Nylon Ribbon	4.30
0413	LX 80 Replacement Ribbon	5.50
0414	Ibico Ink Roller	4.60
0415	Epson JX80 Ribbon	14.95
0418	Juki 6100 Ribbon	1.55

ORDER FORM

CARRIAGE. Please **add £1.00** carriage to all orders except Computers, Monitors, and Printers **add £7.00** per item. Disc Drives, 2nd Processors, Modems etc. **add £5.00** per item. Listing Paper **add £2.00** per box.

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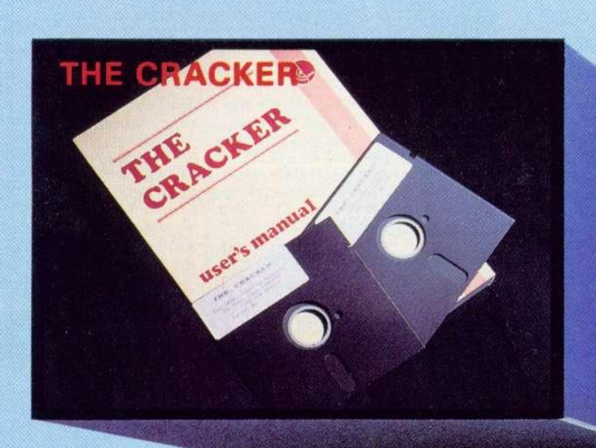
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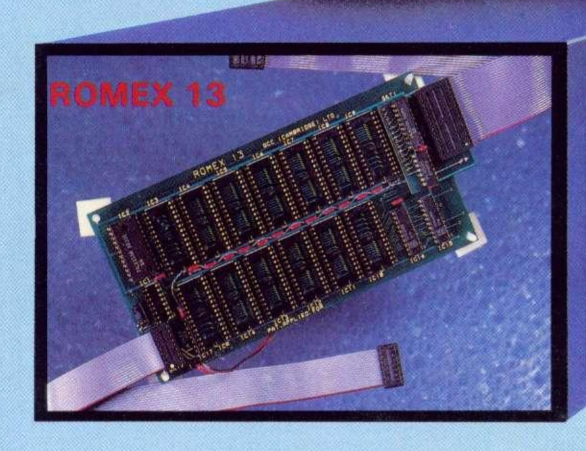
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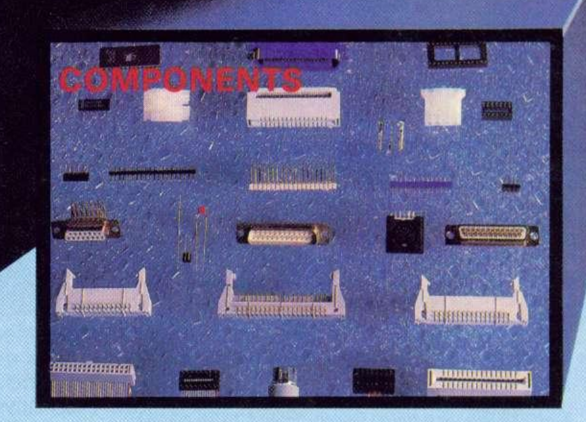




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". . . . . for those who want an expansion board (RAM/ROM) of the highest specification the RAM ROM 15 will not disappoint". (Acorn User April 1985). The RAM ROM 15 is an external board which allows the use of a maximum 16 sideways ROM sockets plus the necessary hardware for up to 16K of battery backed sideways RAM. With "No Solder" installation, the fully buffered RAM ROM 15 can be optionally powered by an external PSU, thereby virtually eliminating power drain and overheating problems.

RAM ROM 15 is "of the highest specification" but ONLY £99.99 + P. & P. = £103.49 inc VAT.

5¼" SINGLE DISC DRIVE

This highly reliable, high performance half height single 5¼" disc drive is fully BBC compatible 400K 40/80 Track switchable drive. The drives come complete with all necessary cables, formatting disc and disc drive manual, one year warranty and are supplied in a BBC colour coded metal case. Equally at home alongside or on top of your BBC Micro at £170.00 + VAT = £195.00 inc P. & P.

MONITOR STANDS

These robust metal monitor stands are finished in the same colour as the BBC Micro. They are available in two heights:

The High Stand: Which enables the stand to be used in conjunction with the BBC Micro and disc drive.

The Low Stand: Fits neatly over the BBC Micro on its own.

To tidy up your BBC, Disc Drives and Monitor, these drives are available at:

High Stand £18.00 + VAT = £20.70 inc. P. & P.
Low Stand £16.00 + VAT = £18.40 inc. P. & P.

5¼" DUAL DISC DRIVE

Finished in a metal case the same colour as the BBC, this slim compact dual disc drive, fully BBC compatible, is at home on top of the BBC Micro and is angled to allow easy access to the drive doors. Featuring twin 400K 80 Track drives the unit is also 40/80 Track switchable, the switch being mounted on the front of the unit with LED illumination.

Complete with all necessary cables, formatting disc and disc drive manual and a one year warranty, the complete unit is available at £358.00 + VAT = £411.70 inc. P. & P.

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BBC Disc Interface Kit 1.2 ROM	£91.30 + VAT = £105.00
BBC A to B Upgrade Kit	£60.87 + VAT = £70.00
BBC Memory Upgrade Kit (8 × 4816-100NS)	£17.39 + VAT = £20.00

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Kaga Amber Screen	£119.00 + VAT = £125.35
Kaga Green Screen	£109.00 + VAT = £125.35
NEC, Green Screen	£109.00 + VAT = £125.35

COLOUR MONITORS

Kaga Vision 2 High Resolution	£285.00 + VAT = £327.65
Kaga Vision 3 Super High Resolution	£399.00 + VAT = £458.85

DAISYWHEEL PRINTERS

Juki 6100	£346.95 + VAT = £399.00
Juki 6300	POA

DOT MATRIX PRINTERS

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Epson FX80	POA
Epson FX100	POA
Epson LQ1500	£890.00 + VAT = £1,023.50
Kaga KP10(NLQ)	£245.00 + VAT = £281.75
Kaga KP910(NLQ)	£375.00 + VAT = £431.25
Star SG10	£240.00 + VAT = £276.00
Star SD10	£326.00 + VAT = £374.90
Star SG15	£326.00 + VAT = £374.90
Star SD15	£411.00 + VAT = £472.65
Star SR15	£495.00 + VAT = £569.25
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Citizen MSP20	£499.00 + VAT = £574.43
Citizen MSP25	£630.00 + VAT = £724.50

BBC FIRMWARE

Graphics ROM	£29.00 + VAT = £33.35
Disc Doctor	£29.00 + VAT = £33.35
Gremlin	£29.00 + VAT = £33.35
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Print Master	£29.00 + VAT = £33.35
Pascal	£59.00 + VAT = £67.85
Forth	£34.72 + VAT = £39.93
View	£52.00 + VAT = £59.80
Wordwise Plus	£49.00 + VAT = £56.35
Beebase	£35.00 + VAT = £40.25

BBC ACCESSORIES

STARdataBASE	£65.22 + VAT = £75.00
Cracker	£62.50 + VAT = £71.88
Single 400K 5¼" Disc Drive 40/80T Switchable	£170.00 + VAT = £195.50
Dual 800K 5¼" Disc Drive 40/80T Switchable + PSU	£350.00 + VAT = £402.50
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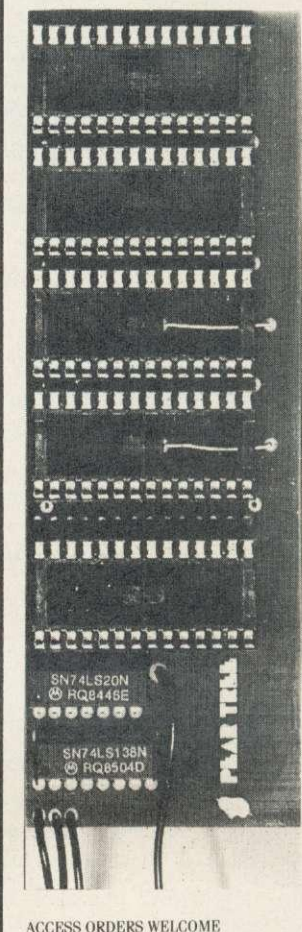
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See the table opposite for details on how much you can expect to pay for this upgrade.
This offer means that Compshop has a number of second hand BBC's for sale, both with and without Disk Interface, all with new cases, power supplies and keyboards, and all with 3 months warranty.
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EPSON FX80	299.00
EPSON JX80	449.00
JUKI 6100	299.00

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1441	375.00
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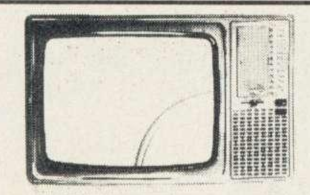
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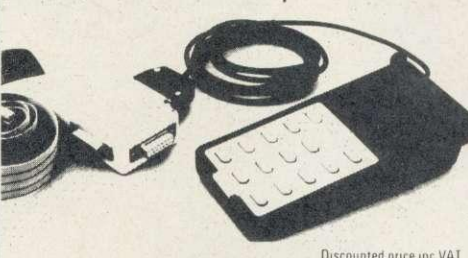
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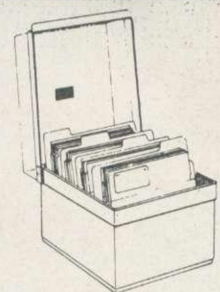
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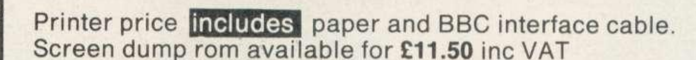
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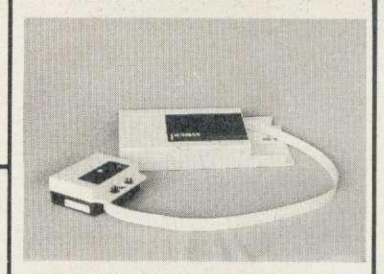
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A fitting partner for the Nightingale modem, **Commstar** was nominated for the 1985 British Microcomputing awards, a remarkable achievement considering the very recent awareness of the true versatility of communications via the computer. With its powerful combination of Viewdata and ASCII terminal capabilities contained in one 8K Eprom, **Commstar** is probably the only communications Software you will ever need, as its many thousands of users will testify. Although it is unusually versatile, it is extremely easy to use as full advantage is made of the BBC's function keys and a comprehensive manual describes each of **Commstar's** features in simple terms. In addition to preprogrammed functions, items such as logon strings and passwords can be placed under the function keys to facilitate automatic access to the vast range of services which are now available.

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The prize includes a return flight to New York, 6 nights accommodation in a high quality New York Hotel, and spending money to the total value of £400.

Full details are contained with each modem.



Nightingale Modem £119 plus VAT; Commstar Software £29.57 plus VAT; combination package £139 plus VAT



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Although similar to Educational 1 this tape is more advanced and aimed at seven to twelve year olds. The tape includes MATH 1, MATH 2, AREA, MEMORY, CUBECOUNT and SPELL.

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EDUCATION

NEWS

Music for young ears

Music teachers who have tried using a computer, either for synthesising or as a teaching aid in music theory, will be pleased to hear of an excellent new program. Aimed much lower down the age range than is usual – at the three-to-seven-year-old age-group – and written by Marion Broadie and programmed and published by System Software, *Peter Beater's Music Games* has been a long time coming to us after a difficult birth.

Peter Plays with Pitch – the first of the series – includes Melody Rainbow and Musical Jigsaws. The programs are designed to encourage and develop aural skills, and interest and self-confidence in music. They deal with the concepts of higher and lower notes, allowing children to experiment freely with pitch and rhythm, and compose and play back their own works.

The graphics and general presentation are very striking, and the program has been tried out in a number of situations. These include an MEP project at Salford, which is producing an *Inset* pack providing support materials for this and other programs.

Enquiries to System, 12 Collegiate Crescent, Sheffield S10 2BA. Tel: (0742) 682321.

Modules teach micro control

Following the very successful Microelectronics For All (MFA) materials, the MEP Electronics Education Development Department at Salford University has produced, in association with Unilab, a new package of hardware modules and teaching materials covering the important area of microprocessor control.

The hardware modules include an eight-switch input, a sensor module and analogue to digital converter, and various output devices including LEDs, relays, and a power digital to analogue converter. All these modules are compatible with the computer interface which Unilab produced for Microelectronics For All, and which plugs into the Beeb's user and printer ports.

The main manual traces a route through control, which starts with the basic techniques of outputting a binary word through a port, and proceeds in easy stages to describe how sequences are built up from outputs and time delays. It demonstrates how inputs can be used to initiate control sequences and, finally, how inputs are used to modify the sequences, using the fundamental concept of feedback. The main book is completed with a number of suggestions for project work.

In order to add flexibility and let schools use whatever computers and/or languages they already possess as central controllers, a number of 'mini-manuals' have been written which show how to solve a number of simple problems using a specific controller or language. No less than four of these use the BBC micro, mainly because of its excellent input and output facilities, and the ease with which other languages can be implemented. The four manuals use BBC Basic, Control Basic, Control Logo and MCL (Micro Control Language) – a derivation of 'C' specially written for control situations by one of the authors (J Oliver Linton), which is to be published independently by Unilab. Further details from Unilab, Clarendon Road, Blackburn BB1 9TA.

Add a synchronised soundtrack

The computer as a teaching aid has given rise to the full range of emotions, all the way from total adoration to utter hatred. Its opponents declare that its use is further emphasising the cult of the individual and removing the teacher/pupil feedback necessary for true communication.

One use that has been steadily increasing, though, has been of the computer as electronic blackboard or even as glorified video machine. BBC Soft, in conjunction with MEP, has taken the whole idea a step further by introducing Computer Synchronised Audio (CSA). This technique combines computer program and audio tape. I quote:

'Whilst the soundtrack is played back off cassette, the computer software provides the visuals. The software is kept in synchronisation by means of key presses. The soundtrack provides all the cues necessary for the user to press the appropriate key at the right time. This software has been designed so that pressing the required key serves not only to re-set the timing routine which keeps the computer synchronised with the soundtrack, but also to call up new information. In addition, users are requested to stop the tape periodically so that they can proceed with an exercise at the computer in their own time. These unsynchronised sections make full use of the computer's capabilities and allow users to explore more fully the concepts introduced by the soundtrack.'

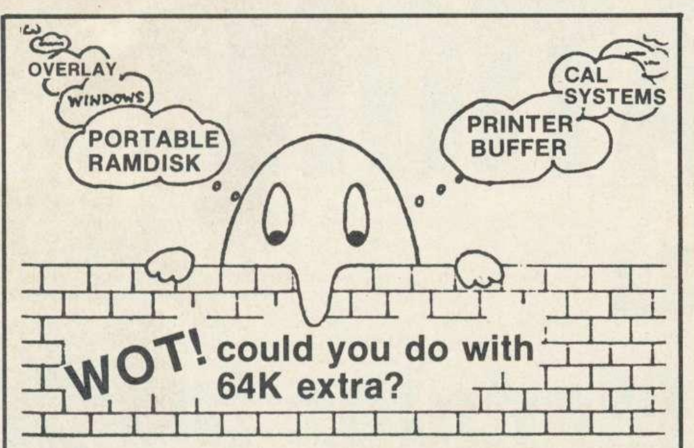

Fred Harris: the voice of CSA

This exciting development provides a tool that is useful to the teacher in the classroom, and the pupil both in group projects and at home.

The first few titles to be produced using this innovation are: *Uniformly Accelerated Motion*, *The Mole Concept* and *Computers at Work*. All are aimed at the secondary school science class and provide a fascinating variation on the traditional concept of software.

Fred Harris, formerly of *Play School* fame and latterly of *Micro Live* notoriety, provides the soundtrack in his inimitable fashion, and the software bears the CET copyright stamp.

Commentary by Nick Evans



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EDUCATION

NEWS

Take up the Chancellor challenge

Geographers will be interested in a program from Chalksoft entitled *Maps and Landscapes No 1*. The disc has three sets of programs covering many aspects of basic mapwork by means of demonstrations and test and practice situations. *Grids* explains the National Grid used in Ordnance Survey maps for both four-figure and six-figure reference numbers. *Conventional Signs* shows the most commonly used signs from OS maps, and *Maps* features several different OS-type maps with questions relating to signs and grid references. The target age-group is nine to 14 and the disc, which comes with copy sheets, costs £17.50.

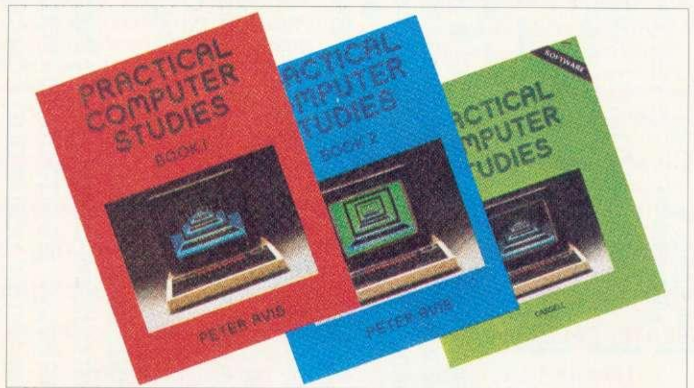
Another offering from the same company which may appeal to historians, economists and social science teachers is *Yes Chancellor* – a complex simulation of the British economy, complete with strikes, runs on the pound and Parliamentary elections.

The user decides the level of taxation and borrowing, and the details of the annual budget. Graphs displayed on screen help to demonstrate developing trends, and the whole package has a ring of authority – not least because it was designed by an economics expert and former senior official of the Inland Revenue.

Readers familiar with programs like *GB Ltd* will enjoy this one. It comes complete with some very searching teacher's notes (although it is just as much a home computer game) which ask questions relating to the economy and its structure, and pose problems about interest rates and borrowing and lending. A testing mindbender for ages 11 to adult.

Details from Chalksoft, PO Box 49, Spalding PE11 1NZ. Tel: (0775) 69518.

Cassels' cut price set



Practical Computer Studies: a comprehensive introduction to computers

Although Computer Studies are the subject of prolonged and heated debate at the moment, new materials for the subject are still being produced. One of the best is *Practical Computer Studies* by Peter Avis, from Cassels. It consists of two volumes – the first giving a comprehensive introduction to computers and how they work, and the second covering examination courses up to the highest levels of 16+.

The book also encourages pupils to develop project work, and the assessment objectives of the GCSE criteria have been kept in mind all the way through.

The set has an accompanying disc of software (10 programs) for the BBC micro, all of which will work with Econet level 2 and most with level 1.

A special offer allows schools to purchase 10 copies of each book and a copy of the software at a 20 per cent discount on published prices. This brings the price down from £111.95 to £89.95, with no limit to the number of packs purchasable. The offer closes on 30 April 1986.

Further details from Cassels, 1 St Annes Road, Eastbourne BN21 3UN. Tel: (0323) 638221.

Software pack to educate teachers

The ISIS Pack is a new venture from South Yorkshire and Humberside MEP in its dying throes (MEP ends March 31 this year), which enables secondary schools to undertake in-school education relating to the use of the computer across the curriculum. The pack's 11 items include software from Acornsoft, Cambridge Micro Software, Glentop, Ephagy and Resource, as well as a modified NESTEC (Newcastle Science and Technology Education Centre) Buggy and interface board.

These packages are not supplied in isolation, however. They are supported by carefully prepared materials, designed to introduce teachers, in as painless a way as possible, to the use of the computer in their particular subject. All notes have been written by teachers and the entire package comes complete with a 'delivery system' that allows the school to create its own structured *Inset* scheme to provide the maximum use of the computer 'tools' provided. The programs are very much orientated to cross-curricular work.

The emphasis of the pack is on educating the teacher, and it is hoped that this theme will be continued, if and when the consortium of LEAs which this centre serves agree to its continuation post-March by the production of a second ISIS package and an ISIS Technology pack.

For further details, contact Resource, MEP Regional Centre, Exeter Road, Doncaster DN2 4PY. Tel: (0302) 63800.

EDUCATION TOP FIVE

	Title	Publisher	Cassette	Disc	ROM	Electron	Shadow on B+	6502	Econet
1	Graphics Extension ROM	Acornsoft	—	—	£29.90	—	—	—	—
2	Pascal	Acornsoft	—	£19.90	£69	—	—	—	—
3	Spellcheck	Beebugsoft	—	—	£36	—	—	—	—
4	French	Pan	£14.95	£19.95	—	—	—	—	—
5	Happy Letters	Bourne	£8.95	£10.95	—	£8.95	Yes	—	Yes

Compiled by Gallup/Microscope. Contact publishers: Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD (0223) 214411; Beebugsoft, PO Box 109, St Johns Road, High Wycombe, Bucks HP10 8NP; Pan Software, Hamilton Close, PO Box 40, Hound Mills Estate, Basingstoke, Hants; Bourne Educational Software, Bourne House, The Hundred, Romsey, Hants SO5 8BY.

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* STANDING ORDERS from the file automatically entered to selected account, for chosen dates, with balance adjusted.
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* PRINT routine of whole or any selected part, within chosen dates, of any account or standing order file, or entire category file.
* RECONCILE account transactions by 'ticking' as they appear on a bank statement or account, allowing a complete check of the account against a bank statement etc.
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* SCROLLING through any account file, standing order file or income/expenses categories, either forward from the start or backward from the end of the file.
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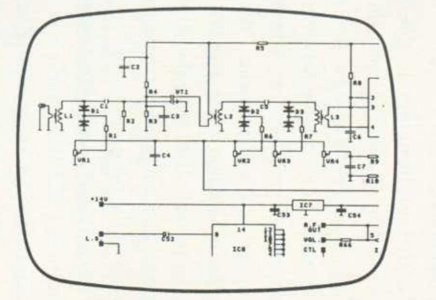
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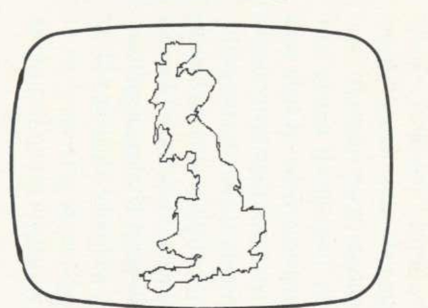
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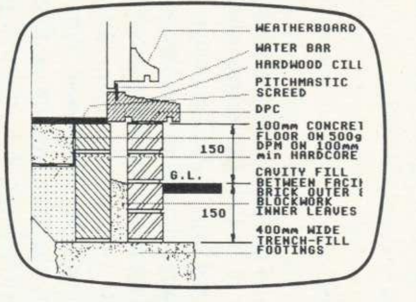
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DABBLING WITH DATABASES

Databases serve a variety of purposes in education – from encouraging a positive attitude to information to helping children become effective information handlers

Chris Drage and Nick Evans

The Cockcroft Report (1981) found that children in schools spent a great deal of time collecting data but relatively little time in interpreting it. A database, however, helps children to focus upon interpretation. It can be used in the classroom for three main purposes:

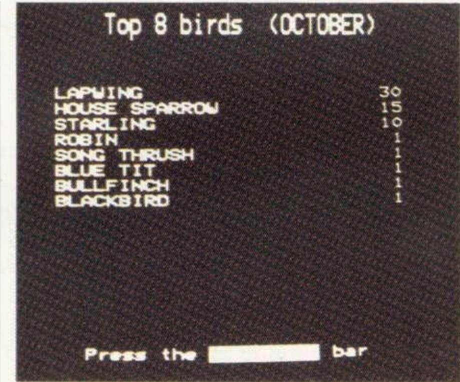
1. As an information source to support children's subject and project work;
2. As a tool for helping them to become effective information handlers;
3. To give active support to the role of concrete experience in learning.

In the first case, children will learn to use the computer to find information related to their needs – and, in so doing, will begin to become independent information retrievers.

In the second case, if children are allowed to create databases themselves as part of their project work, they will develop a much better understanding of how they may be used to handle information. From our work in schools, we have discovered that the educational value of any database lies in the deductions which children may be led to make from rapid 'intelligent' searches of their own collections of data.

We cannot over-emphasise that the real learning from database work takes place away from the computer: careful consideration of the questionnaire, discussion of which units of measurement to use, the drawing of tentative conclusions which then need to be tested.

There are three types of databases used in the classroom. A viewdatabase (like *Micro Viewdata*) stores information on pages and can be thought of as an electronic book. Hierarchical databases, such as Acornsoft's now familiar *Tree Of Knowledge* and *Animal* from MEP, are based on a tree structure. But perhaps the most useful of all are relational databases like *Picfile* and *Quest*. With these, it is possible to find data by asking questions that impose conditions. So, in a database on small animals, for example,



Data from *Bird Watch* output as a table

information is stored under different headings (fields) such as:

wings =
number of legs =
length =

and to search for information, one would ask the computer to find all the records where 'wings = 2' and 'legs = 6'. The computer would then search through the database and display all the records where these two conditions were met.

Children should be made aware that a database turns the computer into a filing cabinet in which their own observations can be recorded under headings that they themselves have selected. Expenditure on such content-free software is money well spent, as the applications range wide across the curriculum.

An ideal introductory system is *Picfile*, a universal database program. It can be used effectively by competent readers of eight years and above, and will teach them the principles of data collection and retrieval. Its strength lies in its dialogue style, graphic output and printer options – but, like *Factfile* before it, there are some serious drawbacks. File length and headings are limited, and older children will become irritated because the software does not always produce the graphic results they expect. But the documentation and datafiles provide an excellent starting point.

At the other end of the scale, there is *Questd*, a disc- (or ROM-) based system which is far more versatile and powerful than *Picfile*. However, there is a tendency for the difficulty of operation of a database to increase in direct proportion to the power and complexity of the system. *Questd* suffers from this drawback. It has a complex and powerful command structure; but, to use this database efficiently, it is necessary to memorise the commands and the syntax of the command structures, which is beyond the capabilities of many primary schoolchildren.

Another problem lies in *Questd*'s limited ability to display results graphically.

Against these drawbacks, one must weigh the versatility of stringing together commands in sentence-type structures, which makes the sifting process much quicker. Also, *Questd* is capable of handling more than 900 records per file (more than 4000 with the ROM plus disc version); so it's a good database for use at the top end of the primary school.

The Advisory Unit for Computer Based Education (AUCBE) markets a number of prepared datafiles for use with *Questd*. Perhaps the most interesting of these is the 'weather' file, from which some extremely valuable correlations and comparisons can be made at both the primary and advanced level. It provides a starting point for children's own weather-data collection and includes many suggestions on how to use the file. In addition, the *Q-map* software allows data to be plotted into pre-prepared maps and diagrams.

Somewhere between the above two are some excellent dedicated databases published by Resource under the auspices of the South Yorkshire and Humberside MEP.

In order to establish the role of the computer firmly within the context of the curriculum,

EDUCATION

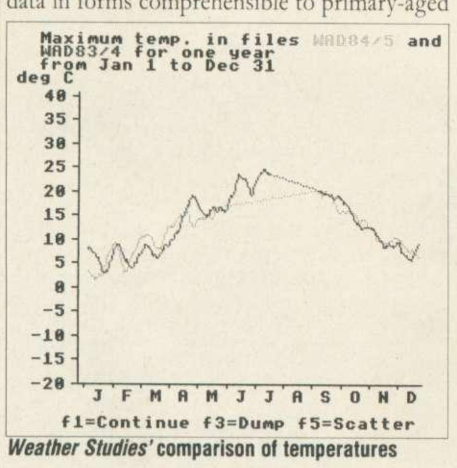
Resource has concentrated on producing databases which provide graphic output without being too complex.

Birdwatch and *Flower Search* offer children the chance to create and interrogate databases on two popular primary school topics. Information can be displayed in four ways: as a record, a table, a piechart or a barchart. Unfortunately, both lack the option to provide a printed copy of the display.

Which Flower is a database that develops observational skills. *Place Names* can handle information about the meaning of place names and could be used as part of a larger project on settlement. *Library* provides a valuable catalogue system which allows a search by topic rather than book title, and can hold over 1000 records. *Weather Studies* is for storing data collected from a school weather station, and allows comparison of any weather factors recorded over a month, three months or a year.

Display Data lets children display their own collected data as a wind rose, barchart or piechart. This useful program is not a database as such, but allows children to concentrate on interpreting the data, and complements any non-graphic database very well.

What these all have in common is a clear style of presentation and the ability to display data in forms comprehensible to primary-aged children. They provide excellent starting points for class study, with the bonus of files that can be enlarged and a framework that is adaptable to individual needs.



***Weather Studies'* comparison of temperatures**

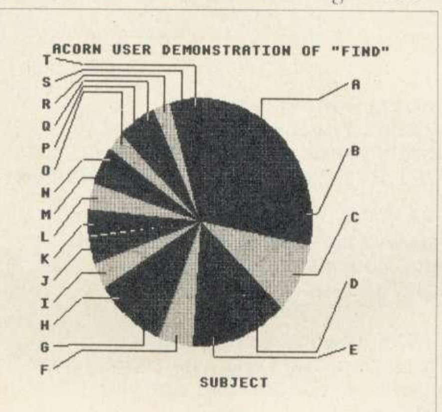
Publishers are increasingly producing resource packs centred on a database – *Castle Pack* is a superb example of this genre. Designed for children with a reading age of nine plus, it provides enough support material to keep a class occupied for half a term. Activity cards direct the children's investigations into the lives of personnel in an imaginary castle in the middle ages. I used *Castle Pack* as part of a larger study of medieval life, and there is no doubt that the children amassed a great deal of knowledge about the castle and its inhabitants.

A more sophisticated follow-up package entitled *Manor Pack* should be released by the time you read this.

Other databases of interest from Resource include *Domesday Database* and *Find*, a powerful graphics database for secondary schools and Econet users.

Find is the result of considerable development work, much of it undertaken by Ian Birnbaum of *Acorn User* and *Assembly Language Programming* fame. This versatile and flexible package offers disc-based sequential file searching . . . with all the bells and whistles!

The package may be used in any situation where rapid sorting and extraction of data file information is required. *Find* is Econet-compatible – a rare and remarkable thing in itself – and provides full graphic output in the form of barcharts, piecharts, scattergrams and scatter tables. Its syntax for creating searches is less tortuous than that of other packages, and a 'junior' version exists to introduce younger children to the concept of databases and to *Find* itself.



***Find*: useful for rapid sorting and extraction of data**

A second package – similar but much more expensive – is *Dataprobe* from Addison Wesley. This database performs a slightly different subset of routines from *Find*.

For example, it has much greater graphic facilities, but does not have a 'jump record' facility, nor can it alter so extensively the size and structure of the datafile.

Dataprobe does come with an impressive amount of material in the form of data files, teacher support materials and general information. The basic pack contains the Kensington 1861 census datafile and an additional pack may also be purchased containing files on weather, birds and litter louts.

In a different league altogether is *Viewstore* – part of the *View* family from Acornsoft. This powerful package is capable of rapid searches, which increase by a factor of ten when combined with ADFS or networked to a hard disc.

The great thing about this package is that it can 'talk' to all the other members of the *View* family – so *Viewstore* files may be transformed onto *View*, and vice-versa, provided a structure in the *View* file can be detected.

Trevor Buck, from Casterton Community College near Stamford, writes about *Viewstore*: '(It was) assessed as a means of manipulating all non-confidential pupil information. The main reason for this grew out of a need to know which of the various bus routes the children were on when bussed to and from school. We included the child's school admission record number, date of birth, form tutor, tutor group code, house, sex, postal address, emergency phone number and type of lunch. Three dummy fields were also created for short-term information – eg, trips.

'We found that the results could be passed into a *View* file for immediate use, and were able to produce form lists, year lists, house lists, bus lists and so on. One important area was the numerous letters sent to parents. A mailing list was produced to avoid duplication to brothers and sisters. Savings here alone will probably pay for the system in two years.'

But why, in the first place, should you want to use a database with your class? The reasons are many: it encourages a positive attitude to information that will be important in later life; it allows a child to infer from data ideas that would probably not otherwise emerge; and it provides a structure in which pupils at every level can organise information that has been created by their own endeavours.

And the ability to juggle information – search it, sort it, print it and display it in a variety of graphical forms – is a tool that most primary and many secondary teachers could happily employ.

Dataprobe £45, BBC disc
Addison Wesley, Finchampstead Road, Wokingham RG11 2NZ. Tel: (0734) 794000.
Viewstore £59.80, BBC disc (ROM-based)
Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411.
Picfile £17.50, BBC B (disc)
Cambridge Micro Software, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU.
Questd* £15 cassette, £27 disc, £21 ROM, £45 ROM and disc, BBC B
AUCBE, Endymion Road, Hatfield, Herts AL10 8AU. Tel: (07072) 65443.
Bird Watch, Flower Search, Weather Studies/Display Data, Which Flower, Library, Place Names £9.95 each, **Castle Pack, Find, Domesday, Manor Pack** £14.95 each. BBC disc
Resource, MEP Regional Centre, Exeter Road, Doncaster DN2 4PY. Tel: (0302) 63800.

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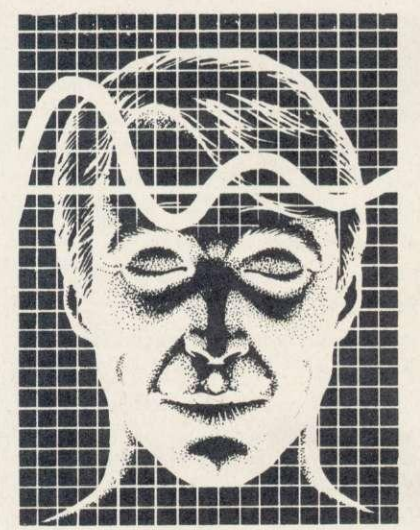
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Rapid Reader (disk only). . *BBC B & B+*	£27.95
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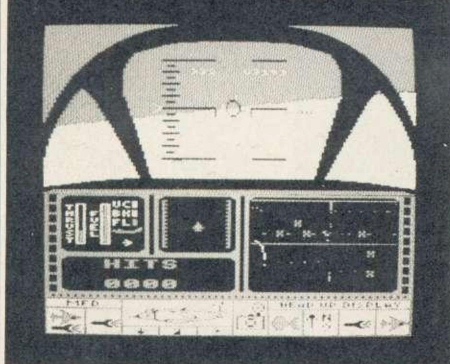
CHARTS

Check out the latest position of your favourite game

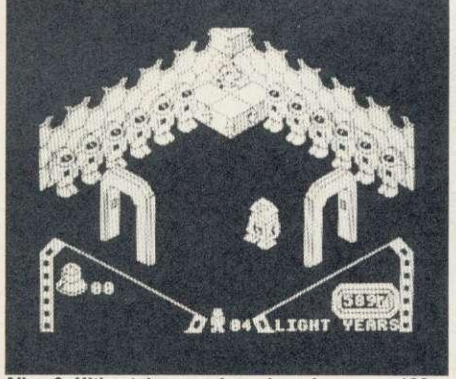
TOP 20 BBC MICRO GAMES

		Title	Publisher	Cassette	Disc	Reviewed
1	(–)	Strike Force Harrier	Mirrorsoft	£9.99	£12.99	January '86
2	(1)	Match Day	Ocean	£9.95	–	January '86
3	(2)	Beach-Head	Access/US Gold	£9.95	–	December '85
4	(6)	Bored of the Rings	Silversoft	£9.95	£11.95	
5	(7)	Elite	Acornsoft	£14.95	£17.65	October '84
6	(4)	Revs	Acornsoft	£14.95	£17.65	July '85
7	(20)	Monopoly	Leisure Genius	£12.95	£14.95	
8	(3)	Combat Lynx	Durrell	£8.95	–	September '85
9	(5)	Jump Jet	Anirog	£9.95	£11.95	January '86
10	(11)	Knight Lore	Ultimate	£9.95	–	November '85
11	(–)	Computer Hits (10)	Beau Jolly	£9.95	–	–
12	(14)	Death Star	Superior	£9.95	£11.95	January '86
13	(10)	Repton	Superior	£9.95	£11.95	September '85
14	(8)	Alien 8	Ultimate	£9.95	–	February '86
15	(–)	Phantom Combat	Doctorsoft	£9.95	£11.95	February '86
16	(9)	Atic Atac	Ultimate	£7.95	–	February '86
17	(16)	Wizadore	Imagine	£7.95	–	August '85
18	(–)	Microcosm	Firebird	£3.95	–	–
19	(–)	Waterloo	Lothlorian	£9.95	£12.95	–
20	(12)	Scrabble	Leisure Genius	£12.95	£14.95	July '85

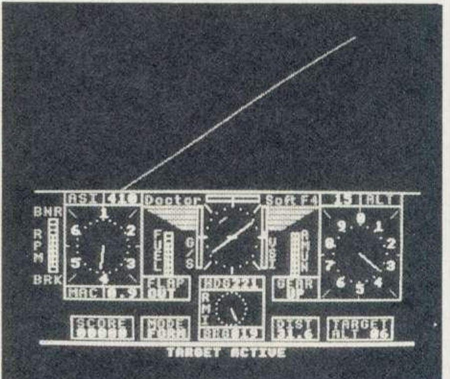
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Strike Force Harrier: Shoots to no. 1



Alien 8: Ultimate's game is reviewed on page 163



Phantom Combat: zooms in to the no. 15 slot

TOP 10 ELECTRON GAMES

		Title	Publisher	Cassette	Reviewed
1	(1)	Beach-Head	Access/US Gold	£9.95	December '85
2	(–)	Computer Hits (10)	Beau Jolly	£9.95	–
3	(–)	Strike Force Harrier	Mirrorsoft	£9.99	January '86
4	(2)	Elite	Acornsoft	£12.95	October '84
5	(–)	Star Drifts	Firebird	£3.95	–
6	(–)	Mini Office	Database	£5.95	–
7	(3)	Bird Strike	Firebird	£1.99	June '85
8	(9)	Escape from Moonbase Alpha	Micro Power	£2.50	–
9	(–)	Stock Car	Micro Power	£2.50	–
10	(–)	Jet Power Jack	Micro Power	£2.50	July '84

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REVIEWS

GAMES

FANTASTIC FILMATION



'Alien-8', Ultimate, BBC B, £9.95

It's quite some time since Ultimate first introduced us to 'Filmation', a remarkable way of producing three-dimensional animation. On first seeing *Alien-8*, however, you will still wonder: 'How do they do it?'

It is set in a vast spaceship, within which is a huge number of chambers: some safe, some occupied by nasties and some inhabited by 'Cryonaughts'. The Cryonaughts are the beings that you, Alien-8, must ensure reach their destination in good health. This requires that you activate each Cryonaught chamber by collecting the appropriate block-type key and using it to activate the life-support systems in that chamber.

Alien-8 certainly preserves all the charm of *Knight Lore*. The nasties still possess their own characteristics. Some will push you into corners while others will simply vaporise you on contact. In some chambers the only way across from one door to another may be via a block on the head of a particularly unpleasant-looking, Dalek-mouse hybrid, pacing the floor below. Rarely have I seen such a variety of truly 'intelligent' characters in a game. *Alien-8* also contains many new features, including my favourites – remote-control droids which you can guide into hazardous areas.

The only criticism I could possibly make of *Alien-8* is the same as the sole complaint I expressed about *Knight Lore* – namely the poor use of the Beeb's excellent sound facilities. But this is only a small niggle. In every other respect *Alien-8* is quite excellent and I would recommend it highly to anyone looking for something new and challenging. If you haven't played one of Ultimate's Filmation-style games before, then *Alien-8* is a must. The graphics really do have to be seen to be believed.

David Acton

SECRETS OF MASTER MOLE



'The Secret Diary of Adrian Mole', Level 9, BBC B, £9.95, £11.95 (disc)

The only time I ever got sent home from school was when I was 12. That'll teach me to wear one black shoe and one brown.

Adrian Mole's protest was, of course, about the wearing of red socks, and then he did have the lovely Pandora to help him out. If you haven't yet read about Adrian Mole's adventures by Sue Townsend then you've definitely missed out. Level 9 has crammed the contents of the book into several large datafiles to help you experience Master Mole's adventures.

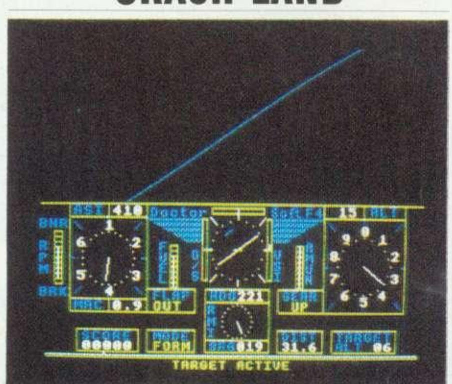
But I wouldn't go so far as to call this an adventure game. It's a sort of multiple choice question affair, where you are presented with three options and choose what you feel is the correct answer. After accepting your advice, Adrian will trundle off and do as you have suggested. Of course, if you answer incorrectly he soon gets back on the right track. There are some graphics with the game – well, call them illustrations as they are static; but they do brighten up the screen somewhat.

While the idea seems a good one, the amusement factor soon wears off, and I'd not be inclined to play it again.

If you haven't read the book, then do so right away – but don't buy the game.

Bruce Smith

PHANTOM CRASH-LAND



'Phantom Combat', Doctor Soft, BBC B and Electron, £9.95, £11.95 (disc)

Is it me or is there a whole flood of these flight simulators hitting the market? After *Jump Jet* and *Strike Force Harrier* we now have a new one from the publishers responsible for the enjoyable *747* flight simulator.

Like *747*, *Phantom* was written with the aid of a professional pilot – and it shows, making the simulator realistic and interesting to fly.

My initial grump is over the choice of keys, which are not as you would expect – how often do you use H, V and M regularly? (A joystick option is provided and I suspect it is about time I repaired my analogue port.) The simulator is an in-cockpit affair with the panel on the lower half of the screen presenting a wealth of dials, gauges and knobs for you to goggle at.

Above the panel you look out of the cockpit down the runway. The view is not really spectacular, but after a few circuits of the airfield, at which I attained Mach 1, this became a minor annoyance. The real test is in flying the Phantom – no easy task. Anyway, after two quick spins I reckon I'm just about ready for the real thing – no more practice runs for me. Crash. Oh well, just one more practice run then.

There are a lot of nice touches throughout, like the whole plane shaking around you as you hit the ground. In fact, the easiest part of this simulator is crash-landing!

Overall a very good flight simulator that comes with the Smith seal of airworthiness. Crash! Ah well, perhaps just one more practice run, then . . .

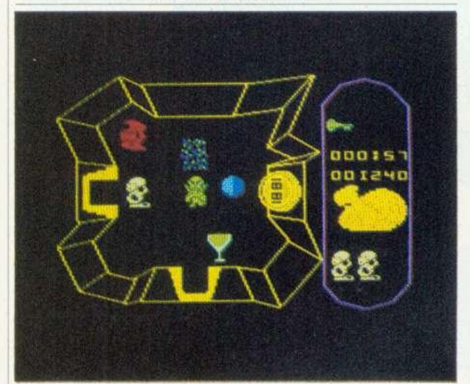
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REVIEWS

GAMES

FAST AND ULTIMATE



'Atic Atac', Ultimate, BBC B, £7.95

Question: how do you make a BBC micro version of a Spectrum game twice as hard as the original? Answer: you make it go twice as fast, of course!

And *Atic Atac* on the Beeb certainly goes. It's set in a multi-level castle, where your object is to retrieve all the pieces of the front door key to enable you to escape.

Careful timing revealed that to cross one of the many rooms on each level of the castle takes just 1.2 seconds!

Your character, which you may choose to be a knight, serf or wizard, faces many hazards along the way. I was pleased to see that the full range of ghouls, mummies and other members of the not-very-nice-really club have been brought over to the BBC micro. The graphics are superb although the use of colour seems to be restricted to the Spectrum's capabilities and not the Beeb's.

Atic Atac has many of the nice touches that turn a good game into a best-seller. These include a marvellous 'energy left' display in the form of a roast chicken being slowly eaten away, and an echoing fanfare at the start of each game – enough to give any Spectrum within listening distance a permanent inferiority complex.

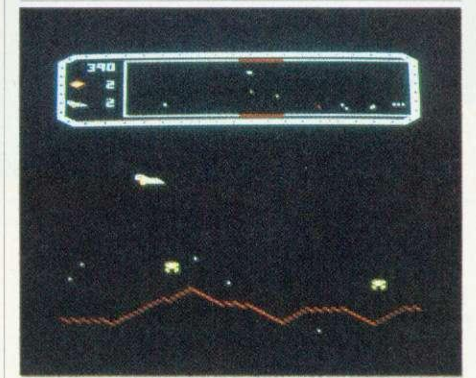
Another quaint feature is that a gravestone is erected wherever you lose a life, to remind you of your past mistakes.

Sadly, this splendid game is not entirely bug-free. On more than one occasion I found myself trapped by a closing door and totally unable to defend myself. But this was the only fault I came across during many hours of playing, and is not as fatal as many I have seen in other best-selling games.

If you can handle the speed of this game then I would highly recommend it. I'm still not sure just how Ultimate managed to cram so much into a Beeb's memory but I sincerely hope that they will continue to do so in future games. Triff!

David Acton

CLASSIC GAUNTLET



'Gauntlet', Micro Power, Electron, £6.95

For the few readers who haven't played any of the several implementations of *Defender* (of which this game is a type), the scenario is the surface of a planetoid. Aimlessly wandering this barren land are a number of examples of a curious life-form. The continuing existence of the 'canisters', as the life-forms are called in this version of the game, is your ultimate objective. But beware! The canisters are under constant threat from the 'landers' which descend from the skies in large numbers. Should a lander manage to carry a canister to the top of the screen, the unfortunate life-form will mutate. Hindering your task are a variety of alien craft which lay bombs, explode into showers of other nasties and in general do all the things one would rather they didn't.

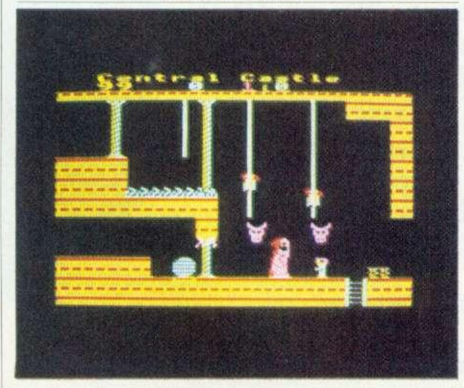
Gauntlet doesn't contain any dazzling new features missing from the arcade original, and as such may only appeal to the purists among the game-playing population. However, a sound, fault-free version of a classic is always preferable to a bug-infested original.

Some nice touches include a demonstration mode and a protected Break key. Even performing a hard reset will merely return you to the start of the game.

The conclusion? Well, there's nothing new here, but Micro Power has brought us a very competent implementation of one of the most popular arcade games. If you're happy with a classic, then I would recommend *Gauntlet*.

David Acton

ACRES OF ACTION



'Citadel', Superior Software, BBC B and Electron, £9.95, £11.95 (disc)

Written by a devious Dane called Michael Jakobsen, the game has a complicated story-line, over 100 interesting screens and a host of problems to solve.

In one simple sentence here's what you do: travel round a huge castle collecting crystals and dumping them in a temple on an island where an evil dictator has built a teleport where his invasion force is due to land but if you collect all the crystals before you run out of energy you can teleport yourself to his planet and collect a statue you'll find in his palace and bring it back to Earth, which will create a field of anti-matter and destroy the teleport thus averting the invasion. Or something like that.

Alternatively, you can forget about the story to start with, and just have fun exploring the castle, avoiding deadly monks, collecting keys to open doors, topping up your energy from flasks and finding useful things to do with cannonballs, buckets, barrels, trampolines and such like.

If that sounds like a pretty complicated adventure, it is. By a crafty bit of Scandinavian programming, all the excellent eight-colour graphics are squashed into only 15k, leaving plenty of memory free for all the locations and characters you'll encounter as you play Superior's game.

It is promised that when you finally destroy the teleport, you'll be rewarded with a magnificent screen display and sound effects to match. I look forward to that, but I don't think I'll be in a position to save the Earth for a while. I still have to explore a few dozen more rooms, and to figure out what to do with this roast chicken I've picked up. (Why not try selling it to *Atic Atac*? – Ed)

Jeffery Pike

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REVIEWS

BOOKS/SOFTWARE

ADDRESSES GALORE



'Within the BBC Microcomputer', Roger Cullis, Losco Ltd, £11.95

This is one of those books you see in the shop which immediately impresses you with its lists of numbers and tables: then, when you get home and sit comfortably, you wonder why you bothered with it.

This particular tome is rather thick, it covers OS1.2, Basic 1, Basic 2, HiBasic, DFS0.9, NFS 3.34, 6502 second processor and DNFS. Simply, it lists the entry points in just about every routine there is within the above. This I admit is quite useful for the MOS and Basics, but the other items have now been superseded and have little value.

The rest of the book deals with each ROM again but lists all subroutine calls and destinations, jumps and other such useless nonsense – in effect, pages of addresses, addresses and yes, more addresses.

The author would have done much better to confine his efforts to giving details of entry points to MOS and Basic and descriptions of how each routine functions. Such details might have been beneficial to some readers – those armed with disassembly listings of the ROMs in question. **Bruce Smith**

SPEAK NICELY TO ME



'Speech!', Superior Software, BBC, £11.95 (disc), £9.95 (cassette)

This is a 7.5k machine code program that makes your BBC micro speak. Great, what's new about that, you ask. The answer lies in the fact that you don't need any extra hardware to make use of it.

No speech interface, no speech ROM, it simply uses the internal speaker on the Beeb to say its words. Now that is different!

To use the program you simply run *Speech!* (ie, *RUN SPEECH). Once installed the command *SAY will cause the words following it to be spoken aloud, ie:

*SAY I'm a clever BBC Microcomputer

Of course these commands can be incorporated into your own programs.

The use of a question mark or full stop allows the pitch of a word to be pushed up or down, respectively.

The reproduction is surprisingly good, and certainly on a par with some of the more expensive speech interfaces I have heard.

*SPEAK enables you to get *Speech!* to pronounce individual phonemes. Using numbers after vowel sounds will alter its pitch accordingly, ie

*SPEAK WEH4LKAHM

Thus certain words can be stressed at the appropriate point.

The overall pitch of speech can be set by use of the *PITCH command.

Because of the large size of the *Speech!* file only mode 7 can be used when it is loaded into normal memory. A relocation program is supplied which allows you to relocate it wherever you wish.

Also supplied is *Speech!* written as a ROM image – thus sideways RAM owners can simply load it in with no loss of memory.

Yet another goodie included is the SAYFILE program. With *Speech!* installed, simply run this program to get it to read out a *Wordwise* or *View* file. Ideally the file should be a spooled version otherwise *Speech!* will try to say any embedded commands it encounters. This facility does not operate too well with *View* due to its lack of a true spool facility. However, it really is great fun to have your copy read back to you!

All in all, an excellent low cost speech system that really is very good value for money. **Bruce Smith**

THE GAMUT OF ELECTRONICS

Microelectronics A to Z, Malcolm Plant, Longman 1985, £3.95

The production of a pocket technical dictionary is no small undertaking, particularly in such a fast moving field as microelectronics. This book is a valiant attempt, but seems a little uncertain of the level of readership it is pitching to. The range of entries encompasses both the esoteric and intriguing (the 'Josephson junction') and the unnecessarily obvious ('PVC tape' and 'to hit').

On the positive side, however, the cross referencing throughout is excellent, practically all terms used in definitions being found as entries in their own right.

There is an obvious bias in the direction of electronics theory, which is the author's own speciality, but I suppose this is fair enough in view of the title. However, I feel that some of the less electronics orientated entries could have benefitted from more detail, specifically the definitions of computer languages.

Overall, probably a good reference starting point, at the price, but definitely not a sole source of information. **Mike Barwise**

POTENTIAL CONTROL



'The BBC Microcomputer in Control', Paul Beverley, Nigel Eames and Geoff Osborne, Prentice Hall, £7.95

This book, subtitled 'Interfacing Projects for Beginners', really falls between two stools. The introduction takes the complete beginner through the interfaces available on the BBC micro in very general terms, but provides no real technical information.

Only two of the projects really appealed to me. Most of them seem to be over-ambitious concepts cut down in an attempt to make things simple. And a couple of them are potentially lethal, both using the computer to control mains-carrying relays. Anything that connects beginners to the mains is to be deprecated, no matter how many disclaimers or warnings are included in the text.

The reader is expected to understand circuit schematics, and to be able to produce PCBs from the printed diagrams. Apart from the hazards involved, this could lead to a lot of frustration, as the artwork is far from good.

I did, however, think three chapters rose head and shoulders above the rest of the book: one on timing slot car races or train sets, and two on communications. They have lots of potential for practical application, and the book might be worth buying for these alone.

Mike Barwise

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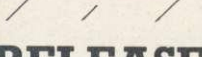
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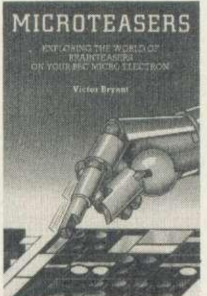
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REVIEWS

BOOKS

TWO FOR TEASE



'Microteasers: Exploring the World of Brainteasers on your BBC Micro/Electron', Victor Bryant, Addison-Wesley, £6.95
'Microcomputer Puzzles', Garry Marshall, Collins, £6.95

Both these books are aimed squarely at the people who like to practise their programming talents by using a micro to attack a problem. Victor Bryant's book consists of a mixture of original puzzles and Brainteasers selected from *The Sunday Times* and the *New Scientist*.

His selection is a good and varied one and the explanations he offers before showing you how he writes the programs are both easy to follow and explicit.

Garry Marshall's offering is much more of a mish-mash, being a collection of extended articles from his regular column in *The Observer Colour Supplement*.

Unfortunately his style is over-ponderous even when putting the simplest of points across to the reader.

Many of his programs are peculiarly machine specific (are there really any TI owners out there?) without warning the reader which machine each program is for, and he is one of those programmers who can't be bothered to renumber the program lines so that listings appear number 10, 12, 13, 16, 20, 35, 40, etc.

This is hardly a good example to set for the (obviously) relatively inexperienced market he is aiming at. **Simon Dally**

CAUTION AT THE RACES

'Winning at the Races Using Your Computer', Paul Worden, Interface, £6.95

This is a bizarre book. It looks good value at £6.95 for 306 pages, has an appealing jacket and is printed on good quality paper. Closer inspection, alas, reveals that the typesetting and design are appalling, misprints abound and the author appears never to have learned how to use an apostrophe correctly. Pages are even printed in the wrong order. Authors and publishers of computer books really should take more care – with wordprocessors there is no excuse.

The author's style is frequently painful in the extreme. Poor jokes ('. . . for practical programs error trapping is mandatory. Feminists read WO mandatory. . .) and gee wiz remarks ('Aren't these computers clever little devils') don't help either. The author's programs (written more or less in Microsoft Basic) would hardly rate three out of 10 in a primary school, being clumsy, sloppy, unstructured and poorly documented.

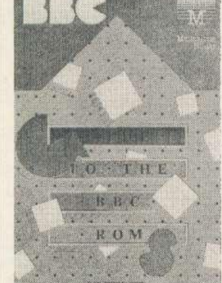
Nevertheless, the author knows a great deal about betting techniques and when he leaves behind the subject he doesn't really understand (computers and Basic programs) and talks about how to bet against the bookies, how to distinguish good bets from poor ones and how to set about weighting the many factors which can have some bearing on a horse's performance, he's extremely interesting.

Competent programmers (especially BBC micro owners) will not bother to convert his programs into BBC Basic but write their own.

A word of warning. Making money off bookmakers is an extremely difficult and time-consuming pastime, and despite some of the claims made in the book, there is no get-rich-quick way of succeeding.

Hard work and diligent research may help you come up with a good betting strategy but don't fool yourself that a computer will do anything more than relieve you of some of the donkey work. Buy this book if you like and understand racing. But proceed with caution. **Simon Dally**

MOS AND BASIC OBSCURED



'Guide to the BBC ROM', Don Thomasson, Melborne House, £9.95

This 230 page book covers the ins and outs of the BBC Machine Operating System (OS 1.2) and the Basic ROM. In fact the majority of the book is given over to a discussion of the MOS.

The author breaks this down quite neatly into sensible segments. Chapters cover initialisation, interrupts, OSBYTE and OSWORD calls, input and output, buffers, the keyboard, VDU control, save and load, the sound system and files.

The approach taken is that of a partial descriptive disassembly. The address of the start of a block of instructions is given, followed by a description of what that block of code does.

It does not provide a disassembly listing in the traditional sense – frightened off, understandably, by Acorn's strong copyright stance – though you really would need to have one to make any sense of what's actually happening.

Unfortunately the author has not put a lot of thought into the presentation of his material which is often difficult to understand. This is exemplified in the final chapter on Basic. Don Thomasson goes to great pains, early in the book, to point out that there are different versions of the MOS and Basic around. However, nowhere to my knowledge does he tell you which version of Basic he is discussing. There are four for the BBC to my knowledge. *I* know that he is talking about Basic 1, but would the average Basic 2 user (who would be baffled when the addresses listed throughout the book did not tie up)?

The chapter about Basic should not be regarded as a guide to the interpreter. Indeed, that would require a book to itself (such as the *Basic ROM User Guide* by Mark Plumbley). The information given here is more of a general overview.

If you are willing to produce a disassembly listing of the MOS, then this book will help you some way towards understanding what it does and how it does it, though you will need to sweat a bit. **Bruce Smith**

TWO BYTE ADVENTURES

'The Bytes Brothers Go to a Getaway,' 'The Bytes Brothers Record a Robbery', Lois and Floyd McCoy, Armada, £1.95 each

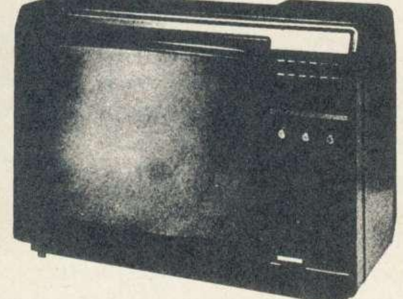
Both these books are part of an attractive American series featuring Barry and Brent Byte who have a series of adventures which are resolved by writing a computer program. Each contains five adventures and, though grimacing at the amount of GOTOs in the programs, the books are good value and should appeal to eight to 11-year-olds having their first contact with a micro. **Simon Dally**

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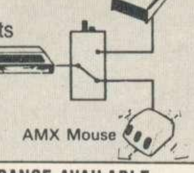
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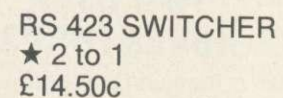
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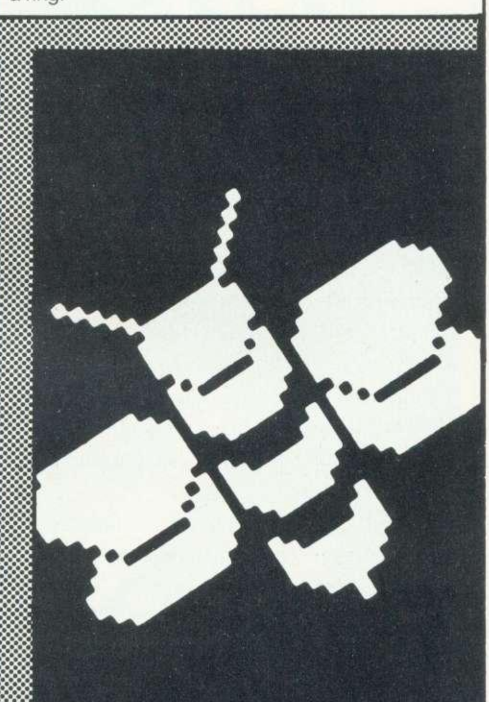
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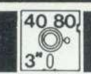
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HARDWARE

IT'S JUST YOU, ME AND A UMI

Ultravox's Chris Cross and Pete Wood on the latest stage in micro music

At last we've found it – a relatively inexpensive music system that we can thoroughly recommend for young bands, keen amateurs and professionals alike. Ultravox has bought two (yes bought!), which speaks for itself. You don't have to give away good quality products to promote them.

It's called the UMI2B sequencer, and it enables you to write music for today's electronic instruments and then save it on to a floppy disc for perfect reproduction in a recording studio or on stage whenever you want it.

Behind the device is the classic development story of necessity being the mother of invention. This in our opinion is vital for such a product as the UMI.

Development

Linton Naiff has been an accomplished arranger for many years working with music and people as diverse in style as Lulu, the Associates and Blancmange.

He needed a system that would help him work on multi-part arrangements at home, saving him precious time and money in the studio, so he could concentrate on developing the arrangements of the songs without all the frightening overheads.

He teamed up with Paul Ludgate, studio manager at the Sound Suite, who designed the hardware, to form a company, UMusic. Linton got to grips with the BBC micro he had bought back in 1982 to write the software for the music system.

So the system was designed by somebody who needed it, as opposed to somebody designing a product to plug a hole in the market (not to mention a hole in your bank balance). What he came up with is a machine that does its job, does it well and doesn't complain. At around £500 the UMI is a serious investment for any micro owner.

System

It comes in two parts, an EPROM (firmware that resides in the Beeb) inserted into any vacant ROM socket, and a compatible beige box of hardware containing the equipment to communicate between a BBC micro and the rest of your music system. There are two ribbon cables that connect to the 1MHz bus and the User Port respectively.

It's all very simple: in the past we have worked with some very, very complicated systems and we have found that simplicity is always the best answer.

On the back of the UMI are various data outputs that can control a multitude of drum machines and up to 16 devices (keyboards, echo machines, etc) fitted with a MIDI (musical instrument digital interface).

MIDI

Until recently every manufacturer had a favourite code or in-built idiosyncrasy which made it impossible to run one set of equipment with another. However, since the emergence of MIDI, things seem to be settling down and most pieces of equipment can plug straight into other pieces.

Once all the connections have been made and the software chip plugged in, the system is fired up using *UMI and you're off. This puts you into a menu page which soon becomes second nature and once you know your way around, it's possible to bypass the menu and go straight from one function to another.

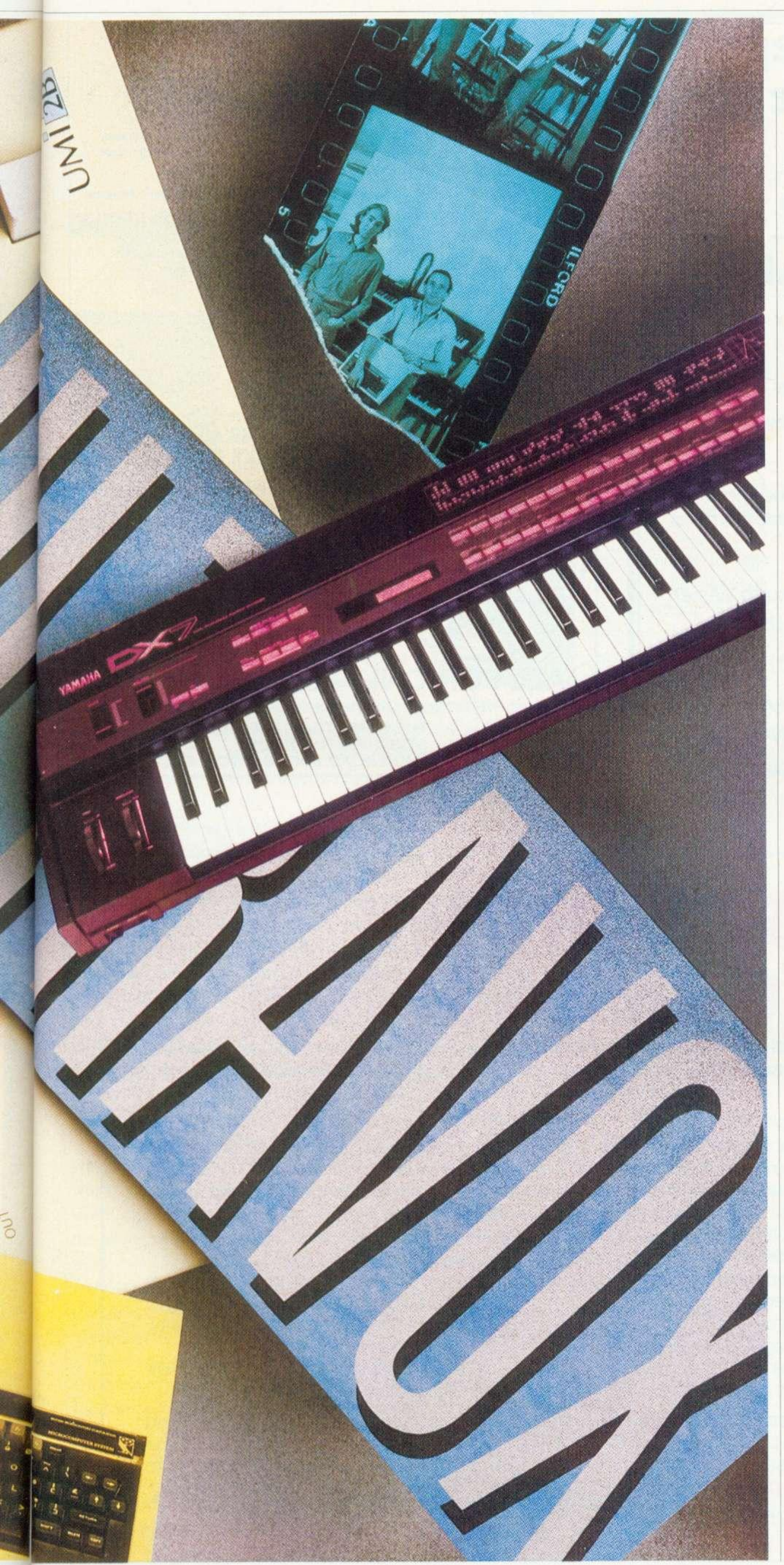
Composing

Composing on the UMI is a dream. There are two ways of doing it: in real-time where you play away on a keyboard, or any MIDI instrument, and step-time which gives a fail-proof method for precise timing.

When playing in real time, you just set a length for a section of music called a 'pattern', fix a tempo and then play a sequence of notes or chords on, say, a keyboard. This sequence is given a number, say pattern 1, which can be up to 16 bars long. Once you've set up a pattern, it can very easily be edited, copied, repeated or erased and then assembled into a 'chain' or track up to 127 patterns long. Other patterns can be created and used in the track. This is done for each instrument as required, and



PHOTOGRAPH BY BARBARA BULLINGHAM



every track is assigned to one or more of the 16 MIDI channels available.

Chains and tracks can be replayed at any time just by pressing the big red 'go' button on the top of the UMI box.

When working in step time, a chord is played and shown on the screen as notes. These can be changed from the BBC micro's keyboard, and their length altered to a degree that would be impossible any other way.

Tracks can be offset to produce phasing effects quickly, transposed or doubled to give an echo effect.

At any stage vital data can be stored by dumping to disc. It is possible to store data on tape, but is more convenient on disc. (One tip here is to constantly update your disc in case of power cuts or mothers with extremely large hoovers, which can ruin a morning's work unless it's been saved.)

A plus for DX7 owners is the added feature that allows you to store all your DX7 sounds on to disc and thus build up a massive library of sounds and effects.

Conclusion

We have found this system to be thoroughly reliable, and it gives you a truly polyphonic 16-track sequencer.

There is a very handy notes page for each song, allowing you to keep a record of which keyboard and sound were used on each track you compose.

We also store our tempo rate here, as this is omitted when saving to disc, (but we're sure UMI will work on that in the future).

When we spoke to Linton Naiff, he actually welcomed comments and constructive criticism of his system and was aware that constant feedback from the user would eventually perfect the UMI.

This feedback has already inspired several updates in the software, the current one being version 4.17A. When improvements become available a simple EPROM swap in your local music-shop is all that is needed to make the most of your system.

We think it is unnecessary to discuss things like graphics here because the UMI is most definitely a tool – all the functions operate clearly, quickly and precisely.

Even if you have to buy a Beeb, a disc drive and a monitor to use with the UMI the cost of the entire system would be one fifth of its nearest Japanese rival, and you've got a good computer into the bargain. What more could you want?

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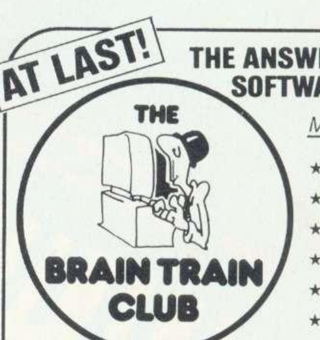
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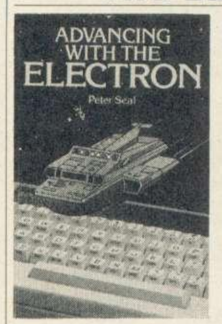
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The 'SKY-BABY' package consists of a C10 cassette containing 5 files (program itself, stellar library and 3 auxiliary programs) and 35-page User Guide (and update bulletins). To get your copy by return of post send a cheque, made out to any recognised charity, and for any sum you regard as reasonable, plus a 31p stamp to:
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REVIEWS

BOOKS

NON-STARTER ON THE ELECTRON



'Advancing with the Electron', Peter Seal, Micro Press, £5.95

There is no doubt that the easiest way to learn about a new subject is to have a definite objective. Therefore a book that sets out to teach the reader how to program the Electron by developing a useful program has the right ingredients for an excellent tutorial.

Advancing with the Electron, is just such a publication. It attempts to lead the reader through the various stages of program development, from putting the original requirement down on paper, through program design and coding, and on to testing and debugging, taking the development of a database program as an example.

The concept is superb, but unfortunately the execution is a disaster. The database program used appears to be a conversion job from another machine which has an unsophisticated implementation of Basic. The code has little structure, is full of GOTOs and GOSUBs with just the occasional procedure (even though the text exhorts the use of PROCs). There are, however, no functions, yet many of the GOSUBs used are for small routines which take input from the user and then return the answer in a global variable – surely one of the better uses of a function?

The text itself is liberally splattered with typographical errors of the worst kind. I say worst because they are not the type of error which a proof reader would find. They are just the wrong words and in some cases it took me many re-reads before I was able to convince myself that they were wrong. Somebody who is actually trying to learn from the book would not realise the errors are there.

These are then compounded by factual errors about the way that Basic works on the Electron and secondly by what appears to be the absence of any editorial control leading to some very strange sections all of which would confuse any would be student.

I did not actually get around to typing in the database program itself, and so cannot comment on its usefulness. It is possible that the book may be a worthwhile investment just to get the listing, but as a means of advancing knowledge of programming in general and the Electron in particular it is a non-starter.

John F Alan

HIS MICRO'S VOICE



'BBC Micro: Music Master Class', Ian Ritchie, Pan/PCN, £5.95

On thumbing through this book I have to admit how promising it looks from its chapter headings, diagrams and programs. It seems just the text book a music teacher would need to be able to key in a program and put notes on the stave with the associated clef sign. A note at the beginning of the book says that all programs have been thoroughly tested on a BBC micro fitted with Basic 2. They may have run when they were complete if they had been keyed in correctly, but in certain cases vital information has been deleted and the recommendation to see your dealer if they don't work is utter nonsense!

Why confuse the User Defined Character (UDC) explanation with Binary? Would it not be better and simpler to label the columns 1 to 128 and tell the reader to add up along the row? There is plenty of room on the right of the diagrams of the UDCs (p106) to show the addition sum used for the VDU23 statement.

Mistakes abound so you must know how to key! There are Printtabs without the semicolons, character string statements without the brackets and GOTO commands with nowhere to go. And the mistakes are not even consistent, they appear in some places and not in others.

It is generally accepted that to make any progress in music you need a knowledge of theory and I was pleased to see the recommendation of the Associated Board's book on rudiments and theory. Don't bother to key in the longer listings unless you are prepared to key correctly, spend an awful lot of time debugging and write your own piece of program for that part which is missing (bar lines, for instance in The Advanced Music Writer).

On the whole – bottom of the class!

P R Broomfield

HIGH STANDARDS IN WORDWISE



'Wordwise Plus: a user's guide', Bruce Smith, Collins, £9.95

Collins is the first traditional firm to have published a proper book on *Wordwise* systems, and Bruce Smith has ensured that it sets a high standard. His book covers both *Wordwise* and *Wordwise Plus*, and helpfully signposts the differences where they matter without making a meal of them where they don't. Not only is Bruce Smith an experienced user of both versions of *Wordwise* with disc, he speaks with the voice of experience on cassette loading and saving – having written an earlier book that way! His friendly style is well-supported by diagrams showing chip-fitting, keyboard positions, tab stops, page layout and screen dumps.

The book also contains a number of programs, and all but the keyboard masochists will be delighted to find that they are available on disc at a reasonable price (disc available at £7.95 from Lovebyte, Dept JM, 8 Grafton Street, London W1X 3LA. State 40/80 track). Some work with standard *Wordwise*: a lovely Basic utility allows disc users to boot the system and see an enhanced catalogue of files on the disc. This displays not only a list of filenames but also a comment line and indication of size in kilobytes. You just have to add a comment line to the top of any files you want picked up this way, using the pseudo-embedded command that the author calls CO. This is a boon to disc users who retain a mixture of different files long past the time when a seven-letter filename conveyed its contents.

The book also offers segment programs for *Wordwide Plus* users. The text processing chapter offers an admirable tutorial for newcomers to the Wordplus programming language. However, the examples of segment programs in part three of the book are somewhat disappointing – they only hint at the system's potential for transforming text in novel ways.

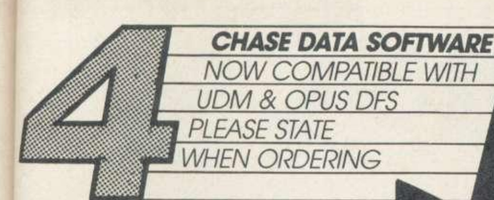
At £9.95, this is not a cheap book, but nevertheless, it will be a good companion to lots of *Wordwise* users and deserves to be widely read.

Jacquetta Megarry

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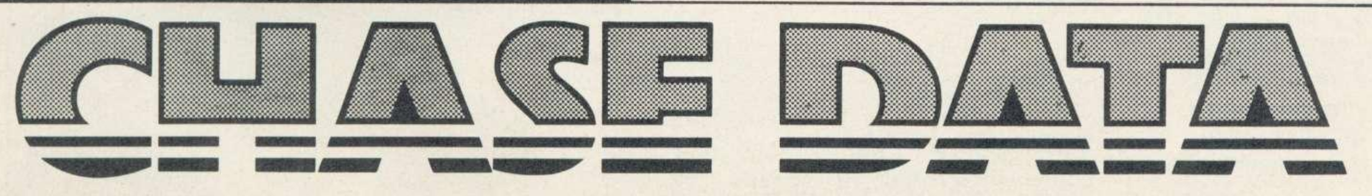
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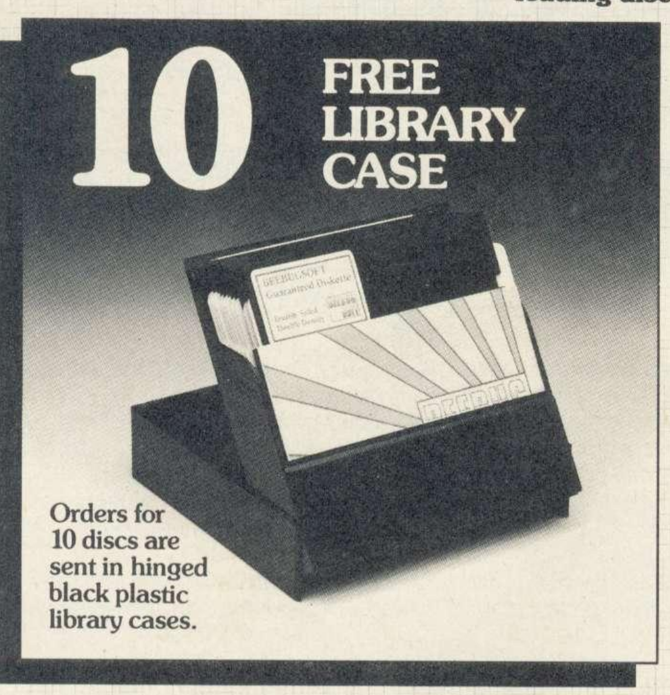

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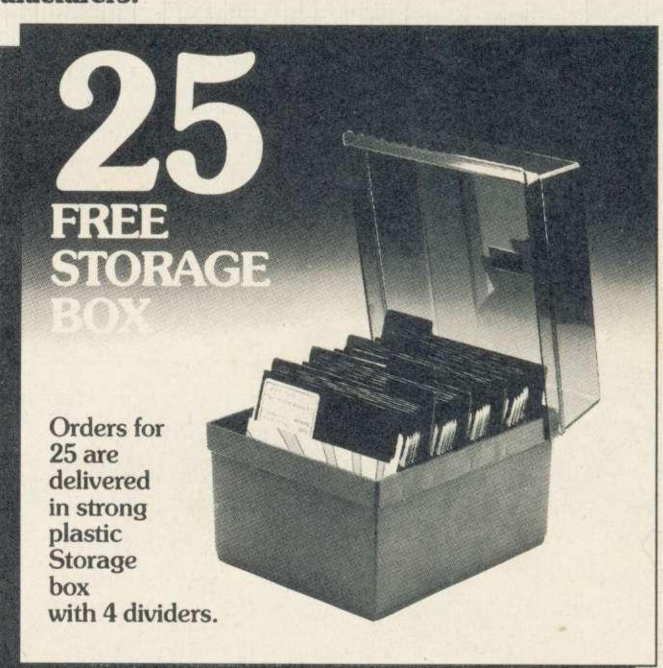


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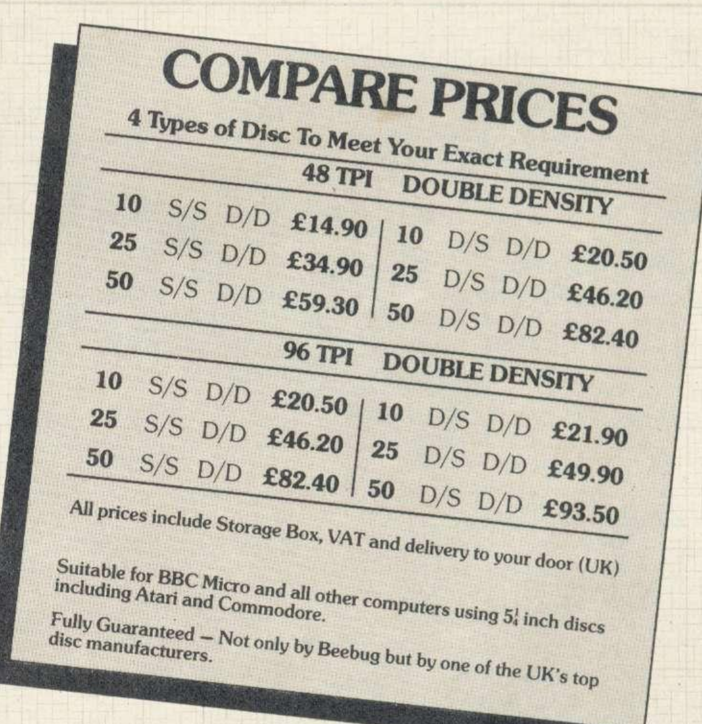
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HARDWARE

JOYSTICK JARGON

Chris Drage's guide to how they work, what they do, which kinds are around – and what they might be able to do for you

One of the earliest and most popular add-ons to a new computer is a joystick. In this respect, BBC micro and Electron (Plus 1) owners have an advantage over many other home computer buffs, since Acorn has seen fit to include an analogue-to-digital converter and some sophisticated circuitry in the machines, making it possible to run both the analogue and switched types of joysticks.

But which would be more appropriate to your needs? And, in any case, what is the difference between 'switched' and 'fully analogue' joysticks?

A switched joystick is quite simple: moving the lever in any one of four directions (forwards, backwards, side to side) will close one of its switches. Thus, they are either full-on or full-off. Most manufacturers now put eight switches in their joysticks to enable them to respond to vertical, horizontal and diagonal movements of the lever. Switched joysticks can plug into the user port – but this type is not recommended as most joystick software is written to run from the analogue port.

However, the joystick really intended by Acorn to be run on its computers is the fully analogue type. This allows for an infinite amount of movement in *any* direction. By using two potentiometers (variable resistors), a value is input to the computer which is proportional to the amount of movement of the lever. If you move it vertically, then only one of the potentiometers moves. If you move it horizontally, the other moves. Moving in any other direction, both of the potentiometers move. The voltages are fed into the analogue to digital converter (ADC) chip where they are converted into numbers between 0 and 4095 (the chip used has a resolution of 12 bits, and 4096 is 2^{12}). The operating system then multiplies these numbers by 16 to give numbers between 0 and 65520. It is these numbers which are subsequently scaled by software to enable points to be plotted on screen.

An obvious test of the proportional type of joystick is of how well it responds in the corners of the screen. Listing 1 is a short program that not only provides a visual comparison of both switched and analogue joysticks but also helps assess whether an analogue joystick is able to reach the corners.

PHOTOGRAPH BY MIKE BOTHA

The 'official' joysticks for the BBC micro are those made by **Acorn**, coded ANH01. Supplied as a pair, they are cased in a strong plastic moulding but would be far better if they were half the size. The chunky handle contains precisely nothing and even an average-sized hand has difficulty in maintaining a grip. It is actually rather difficult to ascertain which way round the joystick is intended to be held. The fire button is large and has a strong feel about it, although it is difficult for children to use. I found it rather annoying that there is no facility to return the small lever to the central position (this can be disastrous in software such as *Aviator*). Equally annoying is the fact that there is no clear identification between the left and right unit, and the cable length is very poor. I can't say I really like these joysticks: personally I would save my pennies to buy one of the models below.

Voltmace produces a number of analogue joysticks in its Delta range. They all look physically similar, and differ only in the number of facilities on offer.

The **Delta 3B** twin system is the traditional arrangement of two joysticks wired to one plug. Each unit measures 160 × 70 × 40mm and comes in a low-profile black polystyrene case. The 40mm shaft is rather small and difficult to use in the heat of furious arcade action, though less so in more sedate activities. In fact, I found by pushing a long plastic tubing over the shaft, I could actually hold the handset between my feet and fly my *Aviator* Spitfire with a 'proper' joystick. The self-centring springs in each handset return the shaft quite firmly to its central position.

The fire buttons are a little on the small side but present no real problems when a fast response is required. The cable length is just adequate for most applications. One pleasing design feature of all the Voltmace joysticks is the use of high-quality graphite potentiometers. They ensure not only full, accurate movement but also a much longer lifespan for the unit as a whole.

If you have no need for the twin set, the **Delta 3B MkII** could be the joystick for you. It is in fact two joysticks in one, the fire buttons being unique to 'left' or 'right' operation. As a general purpose joystick I find this unit an excellent compromise and good value for money. Having a longer cable certainly makes it more convenient in use.



Clockwise from the top left corner: the Kempston Pr[o]stick

The top of Voltmace's range, the **Delta 14B**, is not so much a joystick as a complete system. In addition to the Delta 3B's features it is equipped with a 14-button keypad. As purchased it can only be used as a normal joystick, but the versatility of the BBC micro means that the joystick system is programmable and programs written for the keyboard can be intercepted at the indirection point and diverted to include the keypad. Software written for keys alone can be converted to joystick control. However, before the unit can be used as a keypad a Delta 14B/1 interface box must be added (an extra £14.85).

The handset comes complete with a number of listings to include in your own programs or to load and run before the main program, to convert them to the keypad. Inexpensive overlays may be purchased which clip over the keys and allow you to define each button. Games aside, the Delta 14B can be used as a low-cost numeric keypad or to duplicate any keyboard keys which have an ASCII value.



Pr ick; the Voltmace Delta 3B twin joysticks; the Acorn 'official' joysticks; and the Delta 14B

The interface box plugs into both the A/D socket and the user port. A second joystick socket is provided which also gives access to two A/D channels and the user port for external devices which may be required at the same time as a joystick. Ten pages of instructions contain circuit diagrams and listings to assist you.

To help you make full use of the system, Voltmace also markets the Delta Driver programs. The first lets you select any keys on the keyboard to become either joystick directions or keypad buttons. The second program allows the user to select almost any keys on the keyboard to be duplicated on the keypads of one or two handsets. The handset buttons then operate as those defined functions within the operating system. It complements the first program which is for use with machine code programs. A number of conversion routines for Acornsoft games are also included.

There is no doubt that the Voltmace system is excellent and well thought out. You can expand it according to your needs.

The **Quickshot 1B** is the only joystick marketed by Spectravideo for use with Acorn computers. It is a popular model and an old friend to owners of other micros. Essentially, it is a switched joystick which plugs into the analogue port. It has a tall, moulded grip with one fire button situated on the top and another on the base unit. The wide base is fitted with removable suction cups for added stability on smooth surfaces and an adequate length of cable. The suckers are strong and perform their task well. In use the QS 1B proved a little unresponsive on the left switches, suggesting that there was something amiss with the review model. It seemed as easy to use in the palm of the hand as it is stuck to the table top. The action of this joystick is good, the response fast and the firing easy.

The **Super Champ** joystick was produced by Lion Computers, which has unfortunately gone out of business, though the joystick should still be available from some dealers. (Please let us know if you have any information.) To use this long-handled switched joystick you will need to buy an interface unit such as the one from Bud Computers.

The Super Champ's unusual feature is its base which doubles as a cable reel. The cable is removed by holding the base and pulling the D connector. Rewinding isn't quite so convenient as the cable is wound in using the handle. The idea is good, though, as a tremendous length of cable is available, but you only have as much extended as you require. The grip is comfortable and the response good, but the whole unit sits very loosely on a surface. It is equipped with rubber suckers but they are inadequate because of the base design and the long grip makes matters worse. Neither is it comfortable to hold in the hand. However, its performance overshadows any deficiencies in the design. It appears to be excellent value for money but when you include the interface unit it becomes expensive at £19.90.

The **Kempston Pro** joystick is based on the popular Competition Pro 5000 series which has been a favourite with games players for a number of years now. If the Super Champ is an 'ego' joystick, then the Kempston Pro is the complete opposite. Its short handle reminds me of the gearstick on a Triumph Herald. The Pro is a switched joystick that uses the Beeb's analogue port, and features two large, common fire buttons. The design is quite cunning, as the joystick nestles in the hand very comfortably. I find the action of this joystick springy but not too stiff. It resounds with a positive click as the switches are made. The overall impression is one of quality and solid construction. Of all the switched joysticks, this is the one I felt most at home with.

So which joystick should you buy: a switched model that plugs into the analogue port, or the fully proportional model? The arcade enthusiast will undoubtedly find the switched models of value as most games seem only to require an up, down, right, left and diagonal movement in one speed. However, an increasing number of games do require a fully analogue joystick, *Aviator* and *Snooker* being two examples, and for any graphics work where fast and accurate point fixing is required, an analogue joystick is an asset.

If computer games do improve hand-eye coordination, as some educationalists claim, then only analogue joysticks can really be of value. There is a direct relationship between the position of the hand (joystick lever) and the object on the screen. If the object moves at a rate determined by the software (which is often the case with games requiring switched joysticks), then there is little benefit to be gained.

The joystick you choose will depend a great deal on what you want to do with it. For a general range of applications the Voltmace units represent good value for money, but for the widest possible range of applications the Voltmace Delta 14B cannot be surpassed. As for the switched units, my personal favourite is

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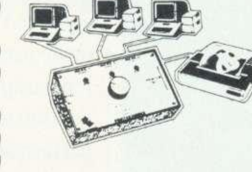
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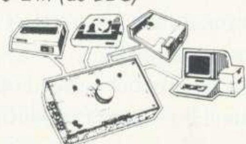
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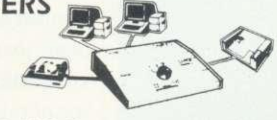


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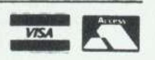
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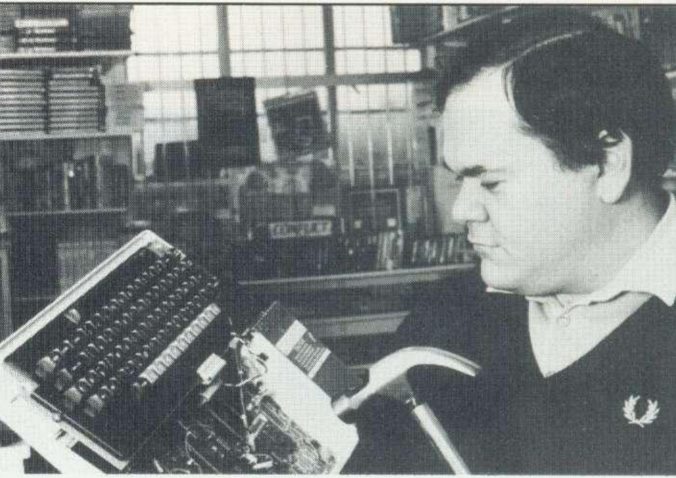


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Delta 3B Twin	Analogue	Three common	No	Yes	1.35m	Both left and right hand operation	£19.95	
Delta 14B Handset	Analogue	Two groups possible	No	Yes	1.77m	14 programmable keys Optional key overlays Delta 14B/1 adaptor box Driver software (cass) (disc)	£14.95 £8.35ea £14.85 £5.95 £9.95	
BBC ANH01 Twin	Analogue	One on each	No	No	1m	None	£19	Vector Marketing, London Rd, Wellingborough, Northants NN8 2RL
Kempston Pro	Switched	Two	Yes	Yes	1.28m	None	£16.95	Kempston Electronics, Singer Way, Moburn Way Industrial Estate, Kempston MK42 7AF
Quickshot 1B	Switched	Two (one on base)	Yes	Yes	1.35m	Sucker feet	£9.95	Spectravideo, 165 Barth Rd, Morden, Surrey SM4 4LH
Super Champ JC 250	Switched	Two	Yes	Yes	2.89m	Cable winds into base unit Sucker feet Interface unit (necessary for Atari type joysticks) including software on cassette	£7.95 £11.95	(see feature) Bud Computers, 196 Milburn Rd, Ashington, Northumberland NE63 0PH

the Kempston Pro. However, the Super Champ is a strong contender – if you can find it. The Quickshot 1B represents better value for money as it does not require the Bud interface unit.

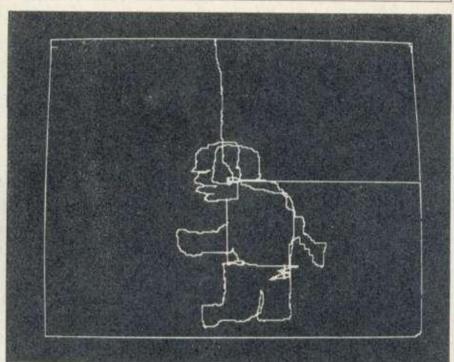
For those who cannot afford the added expense of twin joysticks, listing 2 is a routine to convert a twin joystick game to one run on a single unit (providing both units are not supposed to be in use simultaneously). Run this program then CHAIN in the other program. To change to the opposite joystick, alter 3 in line 180 to 1, and 4 in line 200 to 2. Change 1 in line 240 to 3, and 2 in line 270 to 4, and finally 1 in line 370 to 2. This routine is also useful if one of your pair fails.

If you have an analogue joystick and wish to simulate the movements of a switched joystick, then listing 3 should help. Experiment with the values suggested for lines 180 and 200. If the routine does not work there is probably a ROM in your machine using page 0A00 for its workspace. The remedy is to disable the ROM in question.

I would like to thank the staff of Voltmace Ltd for their technical help in preparing this article and for the program listings.

For Chris Drage's listings, see yellow page 120





Output produced by running listing 1 on the yellow pages on a switched joystick (left) and analogue (right)

Joystick	Delta 3B Twin	Delta 3B MKII	Delta 14B	BBC ANH01	Kempston Pro	Quickshot 1B	Super Champ
Design	4	4	4	2	4	3	3
Construction	5	5	5	4	5	3	4
Stability	4	4	4	N/A	4	4	2
Ease of use	4	4	4	2	5	4	3
Versatility	3	4	5	3	2	2	2
Value for money	3	5	5	3	4	4	2*

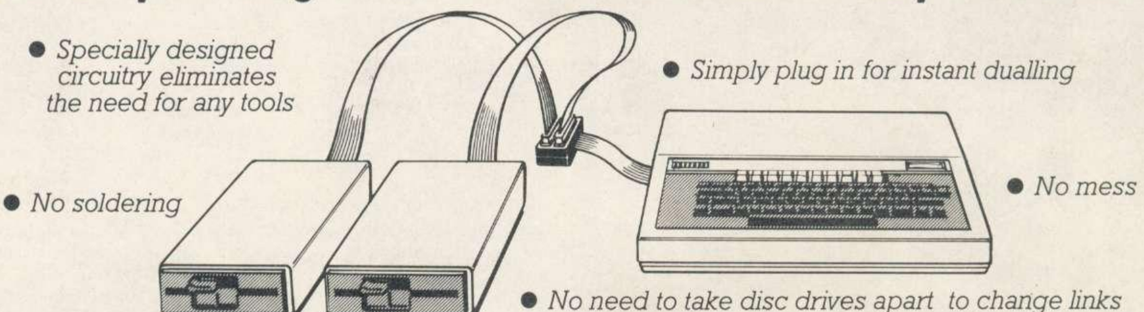
**The Super Champ requires an interface unit for use with the BBC and Electron. This makes it expensive.*

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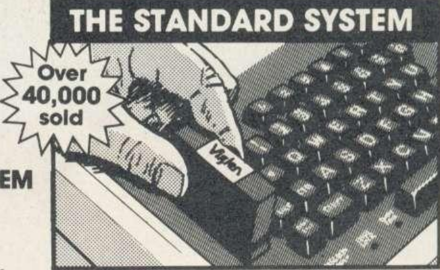
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HARDWARE

TAKE A SPIN IN THE LATEST DISC DRIVES

If you're looking to upgrade your Beeb or Electron don't buy anything until you've read Bruce Smith's update on what's available

Since the disc drive theme of last July's *Acorn User* there have been quite a few notable occurrences within the disc interface/drive market. So over the next few pages I'll be looking at what's new and what you should go for if you want to upgrade to discs.

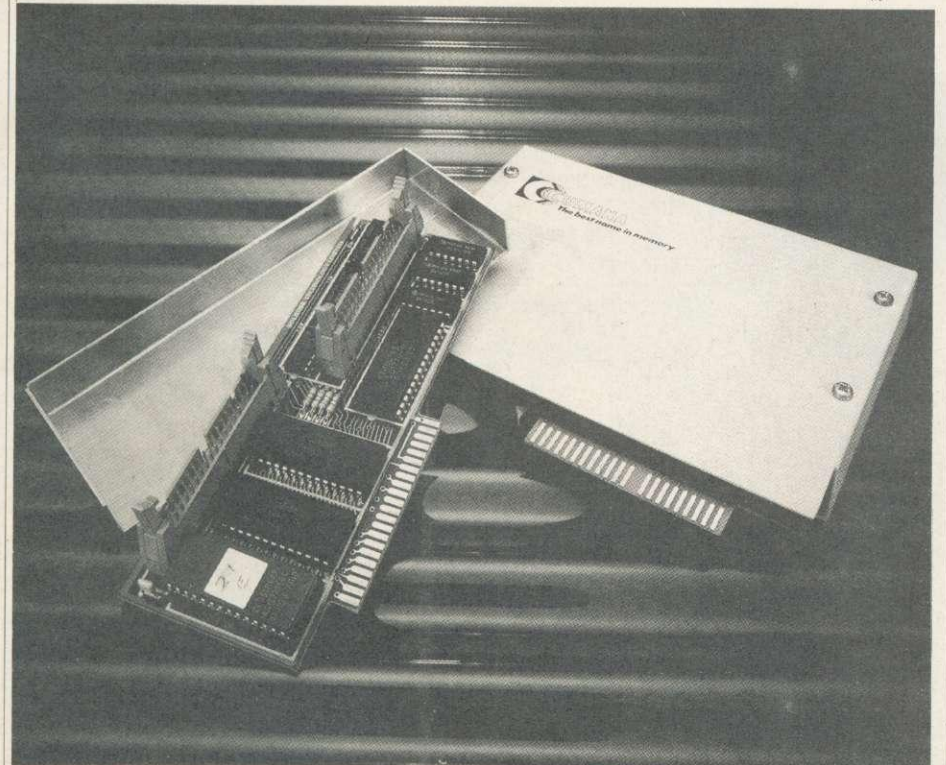
BBC B owners will fall into two categories – those with micros with disc interfaces already fitted and those without. The latter must choose which interface to buy, as well as which drive. Like BBC B+ owners, the former only need to shop around for a disc drive – unless you feel the need to change the interface already fitted. Electron owners will find that the choice of disc interface also governs the type of drive available to them.

Newcomers to the jargon associated with disc drives and the bits and bobs that go with them should refer to the jargon box given on page 185 and to the July 1985 issue.

The most notable disc interface release of 1985 must have been the 1770 disc controller chip for the BBC B (standard on B+ and Electron Plus 3). It is supplied on a small printed circuit board (PCB) about the size of a matchbox. Included in the package are a few extra components and the disc filing system (DFS) ROM.

Fitting the 1770 board is straightforward. It can be performed by a dealer or you can have a go yourself: if you're happy about handling ROM chips then you should manage the upgrade easily in around five minutes. At £49.95 the upgrade is dirt cheap compared with the old interfaces based on the expensive 8271 chip. The DFS (version 2.1 and 2.2) itself is much improved on the original 0.9/1.2 series reviewed in July 1985. It contains commands such as FORMAT and VERIFY, and so does away with the need for a utility disc, though one is provided containing some extra useful routines. However, you are still limited to 31 files per disc surface.

The real capabilities of the 1770 come into play when an advanced disc filing system (ADFS) is installed at a further cost of £29.95 (the Electron Plus 3 has the ADFS fitted as standard). Once it's installed, discs can be used in double density mode, allowing typically 640k of storage per disc. A hierarchical, family tree-type file naming system is used which allows an almost limitless number of files per disc (subject to space of course). The ADFS comes with a utility disc and comprehensive manual, and is well worth the price.



Cumana's Electron interface: plugs into the Plus1 and can support any format of disc drive

Owners of Beebs with old-style disc interfaces may be thinking about switching over to the 1770 and ADFS and wondering whether it is worth it. Certainly if you have the cash it is a preferable system.

One of my main reasons for installing the ADFS was to claim back a batch of discs (which now spill into two large boxes). For example, I copied four 80-track disc sides on to a single ADFS disc with plenty of space to spare. However, the process is horrendously slow, taking the best part of an hour.

The only real concern I still have is software compatibility. In fact it's not the software that is the problem but the disc protection methods. Acornsoft is supplying 1770-compatible software and will exchange existing stocks, but it remains to be seen whether other software houses will be as co-operative. Obviously this protection problem is only a hinderance with disc-based software and non-existent with tape-based software.

The only other ADFS currently available for the BBC B micro is the Solidisk ADFS. This costs a bit less at £20 and is virtually identical to the Acorn ADFS – the box on page 187 details both and the differences between them. To use the Solidisk ADFS you'll need to invest in one of the two Solidisk 1770 boards (one is a dual board that allows the 8271 to be fitted and used at the flick of a switch thus ensuring compatibility with all disc software). These systems were scrutinised in September 1985 and I would go along with reviewer Chris Drage's comments that the boards are not recommended for the beginner, but are certainly a good buy for the enthusiast/hobbyist.

B+ owners who don't want the hassle of the ADFS, but would like a DFS with extend-



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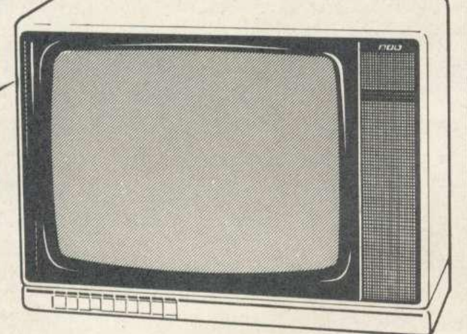
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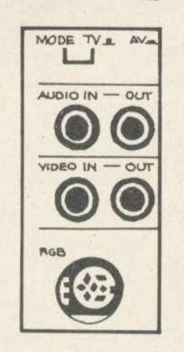
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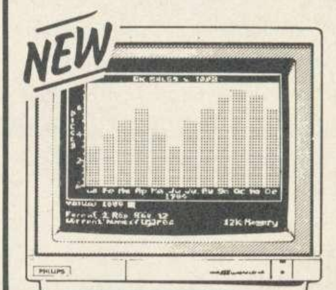
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ed features such as an increase in number of files per disc, should have a look at the Watford Electronics B+ DDFS, which will set you back £40.25.

Electron interfaces

As already mentioned, the Electron Plus 3 contains the Acorn ADFS (details below). The unit is a bolt-on affair – owners of the Plus 1 will be familiar with this arrangement.

The Plus 3 uses a single 3.5 inch disc drive which forms the side portion of the Plus 3; a connector at the rear allows an extra drive to be added if required. Overall the complete expanded Electron makes a neat unit. The drive is relatively quiet and quickish in operation. The main disadvantage is its dreadful £250 price tag – though there are plenty of special offers around. But it is the standard system and as such provides complete compatibility.

Another ADFS-based disc interface for the Electron is the Solidisk EFS, which offers incredible value for money. You get a double density disc interface based on the 1770 complete with ADFS; a Winchester hard disc interface; plus 16k of sideways RAM – all for £59 (including VAT). The construction of the EFS loading is basic. It is simply a board with no fancy packaging and a loose aluminium shroud which is placed around the EFS when fitted into a cartridge slot on the Plus 1.

The EFS can take any configuration drive you wish and works well in use, though it's a bit noisy. It can read DFS and ADFS discs prepared on BBC machines, which makes the transfer of programs between the Acorn machines a simple task.

The final disc interface for the Electron is suppled by Cumana at £74.95. Like the EFS, this plugs into the Plus 1 and is based on a 1793 disc controller. The interface also includes a real-time clock so that date and time can be continually displayed. This information is also saved with files written to disc. Again any type of disc drive (ie, 5.25/3.5/3 in) can be plugged into the interface.

In operation the Cumana system is somewhat slow, especially when compared to the EFS. It also uses a non-standard disc format so that it is not possible to use BBC formatted discs with the Cumana, although a disc based utility is provided to allow for transfer of data between the two formats. A plus is that PAGE remains set at &E00 compared with &1D00 for Plus 1 and &1900 for EFS.

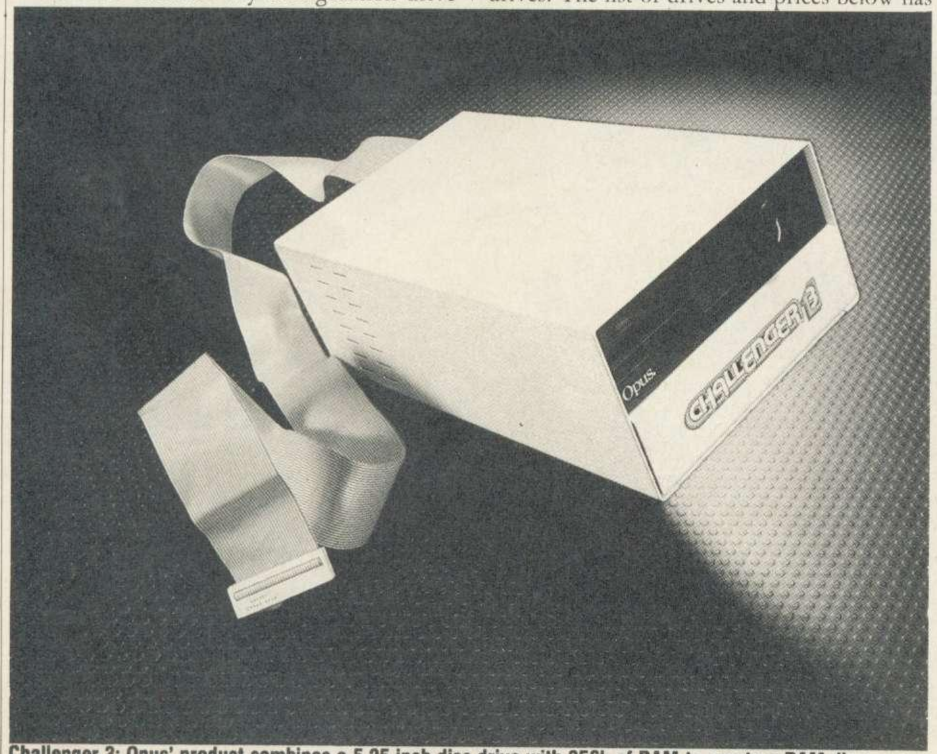
The EFS is probably my favourite of the three systems, but it would be a close run thing if the price of the Plus 3 was to plummet to more acceptable levels.

Disc drives

Once again I would refer you to the July 1985 issue of *Acorn User* and my review of disc drives. The list of drives and prices below has been updated and this should be an accurate guide. To summarise the criteria laid down in the previous review: don't buy anything other than a 40/80 track switchable drive; twin drives are preferable to single drives; an integral power supply is desirable.

The new drives that have found their way into the *AU* office are detailed below in alphabetical order:

Akhter: A nice range on offer. My particular favourite is the twin drives supplied side-by-side in a monitor plinth, below which you can fit your micro. The drives are easily switchable – using the front mounted rocker switches.



Challenger 3: Opus' product combines a 5.25 inch disc drive with 256k of RAM to create a RAM disc

ADFS

The Advanced Disc Filing System as used on BBC B, B+, Plus 3 and EFS utilises a hierarchical system of filenames put together rather like a family tree.

At the top of the tree there are the directories. These are created using *CDIR <name>. A directory can then consist of files or sub-directories. Selecting a particular directory is performed with *DIR <name> and once a directory has been selected files or sub-directories within that directory may be accessed.

The root directory is $ and from this you can build up long filenames that have a pathway to the file. For example:

LOAD"ACCOUNTS.income"

would load the file "income" from the directory ACCOUNTS. Similarly:

LOAD"ACCOUNTS.Vat.totals"

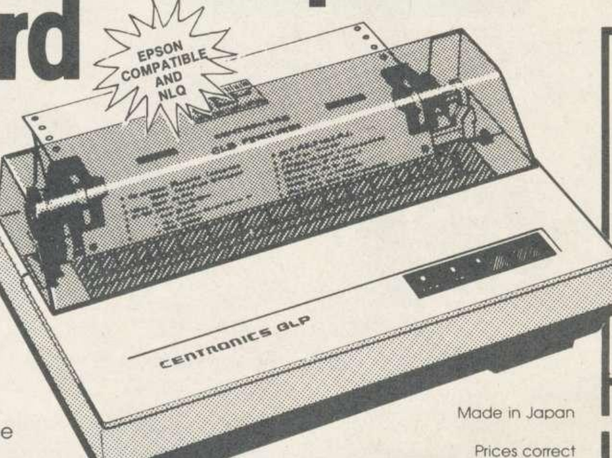
would load the file "totals" from the sub-directory "Vat" held in the directory ACCOUNTS.

Commands common to all ADFSs include: *ACCESS, *ADFS, *BACK, *BYE, *CAT, *CDIR, *CLOSE, *COMPACT, *COPY, *DELETE, *DESTROY, *DIR, *DISMOUNT, *EX, *EXEC, *FADS, *FREE, *INFO, *LCAT, *LEX, *LIB, *LOAD, *MAP, *MOUNT, *REMOVE, *RENAME, *RUN, *SAVE, *SPOOL, *TITLE.

In addition the Solidisk ADFS has a few extra commands: *MVADFS, *MVDFS, *OPEN and *PASSWORD. Use of *OPEN allows the number of files that may be open at any one time to be set up to a maximum of 10. The Acorn maximum is just five.

All come supplied with a utilities disc containing a variety of utilities.

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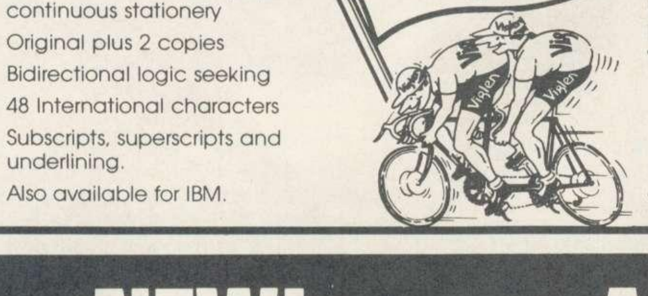
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These elegant drives are reasonably quiet and will set you back £299 (including VAT), which includes a built-in power supply.

The rest of the Akhter range is comprehensive and includes single and dual drives in metal (with power supply unit) and plastic (without PSU). Typical prices for single, double-sided switchable drives are £138 with PSU and £114 without.

Pace: Offers a wide range of drives. The review model was a PDDD3 twin 40/80 switchable drive. This is a traditional stacked drive with a swing-down lock. An integral power supply is completely encased with no exposed heat sinks, and the 13 amp plug is supplied as standard. The 40/80 track select switch is positioned at the rear of the drive, which could make it difficult to access depending on the layout of your system. In operation the drive is very quiet – the only grumble is that there is no on/off light to tell you whether the drive is switched on. Overall very good.

Solidisk: The Mitsubishi disc system being offered by Solidisk consists of a main board case with integral twin 80 track drives, a remote keyboard and ADFS disc interface and has caused a stir selling for £340 (inc VAT). Although they are 80 track drives the Solidisk DFS allows them to be double-stepped and therefore access to 40-track discs is possible.

Fitting the disc system together involves simply removing the top of your Beeb and bolting the disc drive casing over the top – this case can be used to house a monitor. Fitting the keyboard into its new case is not too difficult and enough ribbon cable is provided to allow the keyboard to be used comfortably. However, the keyboard is the weak link of the system: the most annoying facet is that the plastic keystrip cover simply will not fit into its new home, being a good half inch too long. The metal design also makes the whole thing a bit cumbersome. The drives operate adequately but they are a bit on the noisy side.

A cut down version of the system, which you can expand at a future date, is available for £200 – see the Solidisk advertisement.

Technomatic: As from Akhter, a wide and varied range of disc drives are available. At the top of the range are the dual plinth, 40/80 switchable drives. At £281.75 (including VAT) it is about £17 cheaper than its counterpart and consists of a push-down drive lock rather than the turn locking type – it's a matter of taste as to which you prefer. Again an elegant design and front-mounted rocker switches make 40/80 selection straightforward.

The lower priced drives may or may not include power supplies, depending on your needs, and single double sided switchable drives will set you back £138 and £114 with and without PSUs respectively.



Technomatic's stacked dual 40/80 track switchable drives: the company offers a wide and varied range of drives

Solidisk hard disc

The Winchester hard disc is probably the envy of most of us. With 10Mbyte storage capability you can pack all your data into a single small box. But unlike standard discs, the hard disc is not cheap and the Acorn Winchester would set you back a tidy £1500.

The Solidisk hard disc weighs in at just £460 (with PSU) or £699 for 20Mbyte storage. No bigger than a full *AU* binder, the hard disc is unobtrusive and copious amounts of cable mean you can hide it away. At present it will

Disc Jargon Box

ADFS: Advanced Disc Filing System – an advanced version of a Disc Filing System (see below) which allows the disc interface to work in double density mode (see below).

DDOS: Double Density Operating System – a machine code program, held in ROM, that allows double density storage. The ADFS is an example of a DDOS.

DFS: Disc Filing System – this is the machine code program, held in ROM, which controls the disc interface and disc drive.

Disc Interface: The extra components needed to be installed into or onto your micro to allow it to use discs.

Disc Controller Chip: The microchip that provides the circuitry to enable your micro to operate a disc drive.

Double Density: Twice as much information per unit area per disc surface.

PSU: Power Supply Unit – some disc drives have these already built-in; others take their power from the auxiliary output socket on the BBC.

Sector: Tracks are divided into sectors. There are ten sectors per track, and each sector can hold 256 bytes of data.

Track: A concentric path on the surface of a disc onto which data is stored.

40 Track: A disc surface containing 40 tracks or a disc drive capable of reading 40 track discs.

80 Track: A disc surface containing 80 tracks or a disc drive capable of reading 80 track discs.

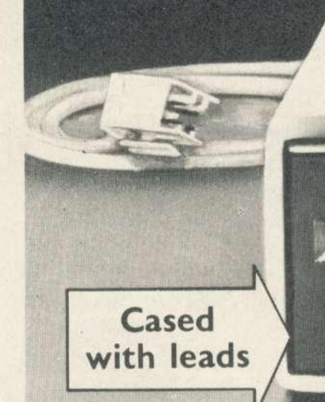
40/80 Switchable: A disc drive that can read either 40 or 80 track discs, normally by setting a button.

1770: A disc controller chip capable of operating in double density when used with an ADFS (or similar).

8271: A disc controller chip. This is not capable of double density storage.

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only operate with the Solidisk 1770 interface(s) and ADFS.

I am informed that it will soon be fully Acorn compatible – I look forward to seeing the firmware – so that it will be capable of working with the Acorn 1770 board and the B+. This would expand its market immediately, selling at a price comparable to that of disc drives just two years ago.

As the hard disc plugs into the 1MHz port you can still use standard disc drives – these becoming drives 4 and 5. The really interesting thing was that it worked perfectly with the Electron and EFS.

Challenger 3

Opus Supplies has combined a 5.25 inch disc drive with 256k of RAM (expandable to 512k for an extra £49.95) to create a RAM disc for the BBC micro.

A RAM disc is rather what it implies: a bank of memory that imitates a disc, ie, it can be catalogued, store programs and data files, etc. So what, you may ask?

Well, the big deal comes in the speed. Being a purely electronic device, actions such as reading and writing are performed in fractions of the time a mechanically engineered disc drive takes.

To prove the point, I ran three programs on the RAM disc and the same three on the standard Opus drive with the following results (timings in seconds):

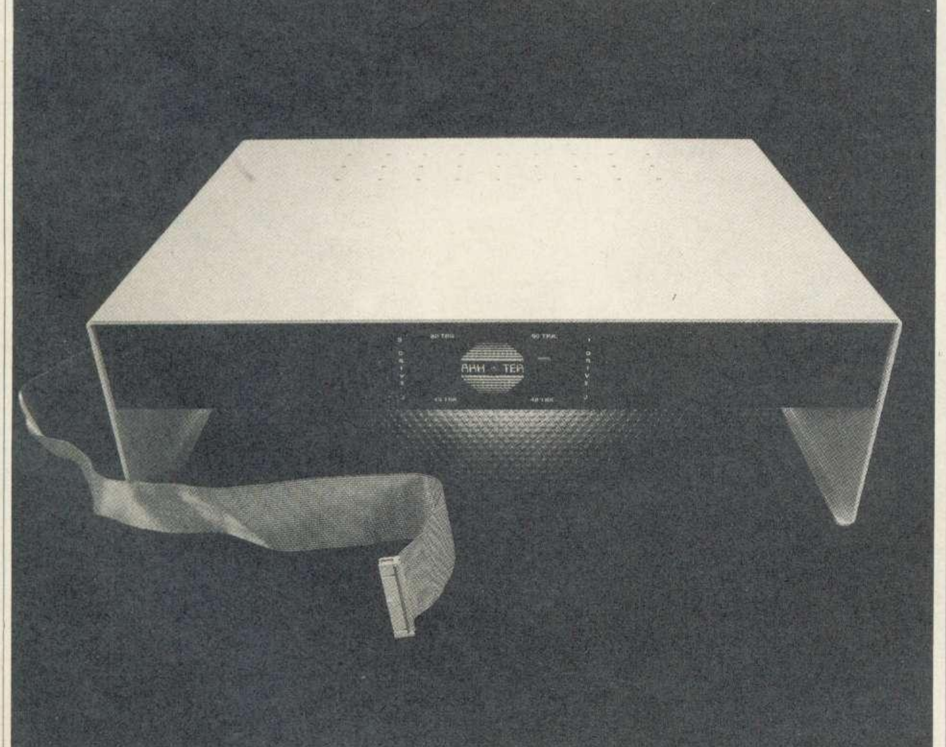
Test	RAM Disc	Normal
1 Save 32k memory	0.34	13.69
2 BPUT 1 to 1000	1.14	4.71
3 PRINT/1000 strings	4.64	10.17

You don't need me to point out the huge speed increases. The straight memory transfer in test 1 was interesting and leads to useful possibilities with graphics as 20k screens can be swapped with just a flicker.

The Challenger 3 is based on the Opus DDOS which Vincent Fojut reviewed favourably in July 1985. The DDOS interface is built into the Challenger 3 which itself plugs into the 1MHz port, thus keeping the disc port free for more conventional use. By default the RAM disc is mapped as drive 4, but it can be reconfigured as any drive number to suit your own needs.

The RAM that forms the disc is not battery backed, so its contents must be saved to a normal disc before switching off if they are to be preserved. Extra RAM is provided for use by the DDOS and thus has the advantage of leaving PAGE set to &E00.

At £249.95 inclusive you get the RAM disc, double-sided 40/80 track drive, Opus DDOS plus manuals and leads. Overall very good value for money, particularly if you are looking for a disc upgrade from scratch.



Akhter's elegant twin drives side-by-side in a monitor plinth cost about £299 and include a built-in power supply

Summary

In doing this review I have been impressed by the standard and quality of the goods on offer. For Electron owners the Solidisk EFS provides a sound interface to which any disc drive can be added. Beeb owners are spoilt with the Acorn ADFS plus the Solidisk version hard on its heels. And the Solidisk hard disc brings megabytes into the home for less than megabucks – and that includes Electron owners!

The Technomatic drives are elegant and well priced and have the slightest edge on their Akhter counterparts. Of course the drives reviewed in July 1985 should not be forgotten, especially the Viglen and GCC drives.

Before you buy any drive or interface check the price with the dealer direct. Also find out whether VAT and postage and package are included. Drive A might appear cheaper than drive B, until you find out that the latter price includes these and the former does not.

I look forward eagerly to the £200 hard disc and 1Mbyte battery-backed RAM disc that will no doubt turn up within the next year!

Acorn 1770 DFSs

There are several versions of the 1770 DFS available at the moment. The first release was version 2.0j which was the DFS in EPROM. Following this was version 2.1 which is 2.0j in ROM.

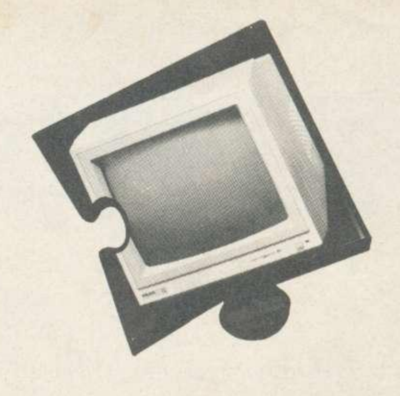
The release of the BBC B+ 128 saw version 2.2. DFS released. This contains the extra commands necessary to deal with the 64k of paged RAM. It also contains a Shift-Z option which makes the 1770 attempt to emulate the 8271 disc controller chip (standard on BBC B) and therefore run protected disc-based software. The 2.20 works on the BBC B.

The next release was 2.22. This was developed to fix an esoteric OSFILE bug. In addition, the 128k associated SRAM utilities have been tidied up to make them more user friendly. However, this version will not work in all BBC model Bs fitted with a 1770 upgrade board. Version 2.23 cures this problem.

In summary, only owners of early 2.0j or 2.1 DFS versions could possibly have a problem. In such instances you are advised to contact an Acorn approved dealer or Acorn itself direct.



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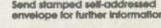
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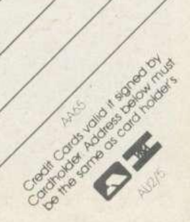
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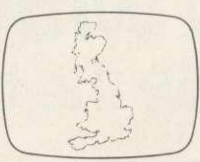
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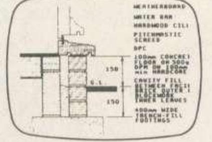
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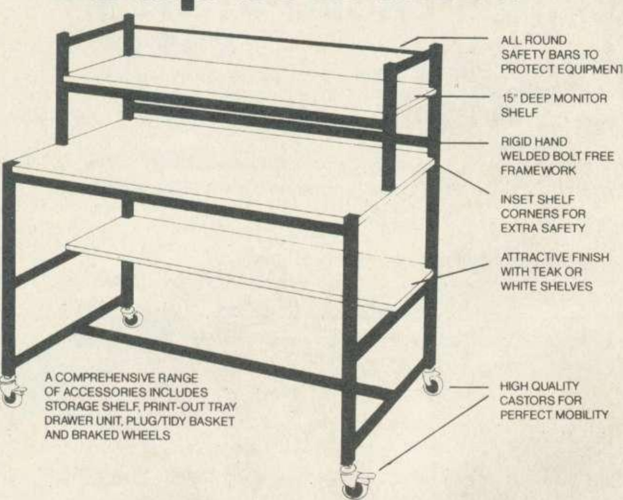
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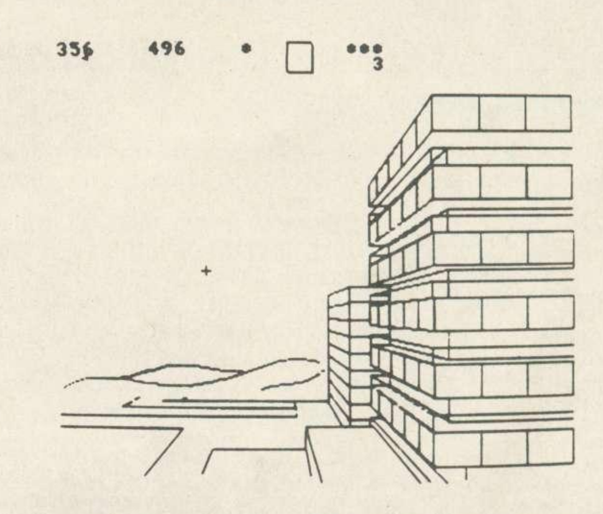
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Canada. Atom Users' Group of Canada: John Wood, 812 Cabot Trail, Milton, Ontario L9T 3M8, Canada
Canary Islands (Spain). BBC Micro Club Tenerife: PO Box 560, 38000 Santa Cruz de Tenerife, Canary Islands (Spain)
Eire. Irish Amateur Computer Club: Austin Vaughan, 35 Monastery Drive, Clondalkin, Dublin 22, Eire. Tel: (01) 593112 (evenings)
Eire. OIFIG (Official Irish Forth Interest Group): c/o Hugh Dobbs, Newton School, Waterford, Eire
Finland. Arjen Raateland, Hopeatie 10A21, 00440 Helsinki 44, Finland
Tel: 90-5625027
France. Club Informatique Assevent: X, Durieux, 7 rue des Warimetz, 59600 Assevent, France
Greece. Microclub: C. Mantzavinatos, 17 Stournara Str, 106 82 Athens, Greece
Tel: 01 3640.675-6
Malaysia. Sabah Computer User Group: c/o Albert Vun. PO Box 69, Kota Vun, Sabah, Malaysia
Malta. BBC Micro Users Club (Malbeeb): Ray Zammit, 'San Jose', Old Railway Road, Balzan, Malta
Netherlands. Big Ben Club: J. Assies, Secretary, PO Box 177, 4670 AD Zevenbergen, The Netherlands
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South Africa. Pretoria BBC Users Group: Stan Miller, PO Box 117, Montana 0151, South Africa
Sweden. BBC User Group (BUG): Anders Wickman, Folkungagatan 58, 116 22 Stockholm, Sweden
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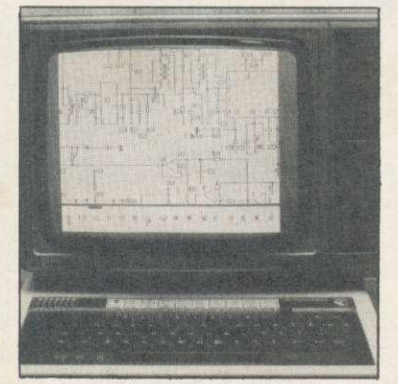
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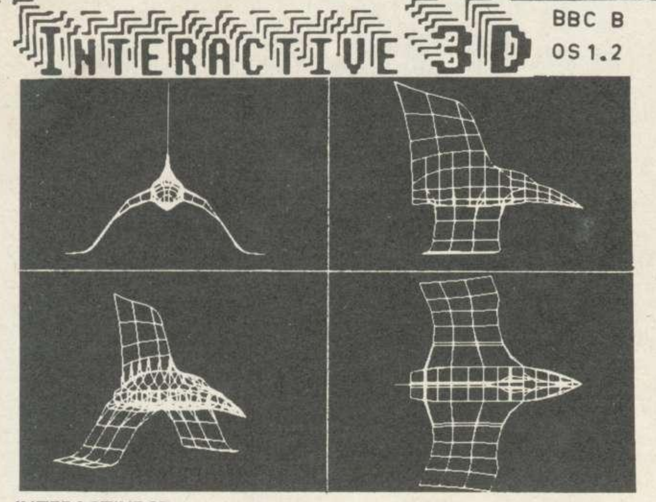
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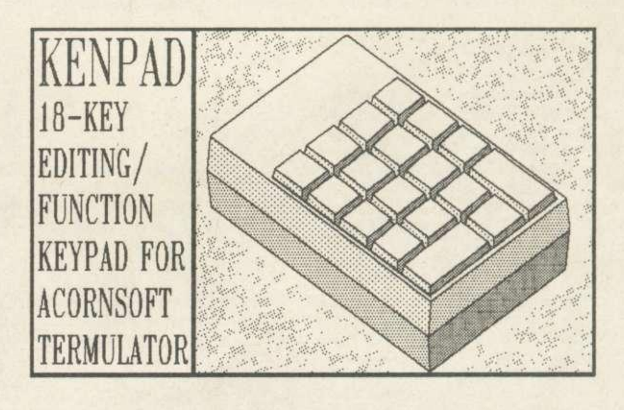
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DISC drive 200k double sided Pertec FD250 5¼ inch, £80 ono. Write to 114 De Lacey Row, Runcorn, Cheshire WA7 2ND or ring Mike on 09285 74497.

SINCLAIR ZX81 complete with 16k RAM pack and cables. Has not been used since bought. UHF modulator and keyboard have been replaced. Reasonable price wanted. Phone David Coulson on Felixstowe (0473) 272452.

BBC-B 1.2OS. New October 1984. Software to include Elite, White Knight, Record Keeper, Hobbit, plus several others. Cost £450+. Will sell for £350. Tel: Thame 6201.

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■ **Hackers Phone Book** Telephone numbers and guide to bulletin boards, mainframes, listed and unlisted worldwide, £6.75. B L Sothcott, 56 Waterloo road, Freemantle, Southampton.

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Please include your cheque for £11.50 (inc. VAT) made payable to Redwood Publishing. This is the standard fee. Don't forget your name, address or phone number. Send cheque plus form to Acorn User Small Ads, 68 Long Acre, London WC2E 9JH. Please print clearly.

ACORN USER'S

DIARY

One 'el' of a problem

You would think that after all this time people would have learnt not to dump listings on a daisywheel. But no, that's exactly what the BBC has done in its latest book *Mastering the Disc Drive* by Christopher Snee. You cannot tell the difference between the characters zero and the letters 'O' in the listings, and in the typeset text, the ones and letter 'el's are the same. Glad we're not on the receiving end of the confused 'It doesn't work' phone calls.

The book is part of the BBC Master Guides series. Now there's a coincidence for you!

His Master's monsters

Interesting copyright date of the year so far. The Master case was done in 1984 and really does show the B+ up for the stopgap it was, filling in while Olivetti hauled Acorn out of the financial mire. But a pity it had to happen.

Mention of the then-top-secret Master in December's Abuser and our forecast of memory sizes certainly caused a stir at Acorn. The board did its nut by all accounts. To those who never noticed, it'll teach you to read the Abuser more closely in future!

Bob Coates at Acorn told us he was putting his shirt on the line for the Master being out in February. If it's not, he added, he's on the line.

New way of naming software at Acorn – they use the author's name to start it off. Already there's TimPaint, TimForth, and PaulComal.

New ones expected for the Master include Hermann Monsters.

The BBC B is dead, long live the B+. The B+ is dead, long live the Master. The Master . . . the BBC'll never let them kill that one off – what would Dr Who do?

New Year Resolutions

BBC

David Atherton: to get a clean pair of sunglasses and buy a dot matrix printer.
Micro Live: keep it alive and warm it up a bit.

Acorn

Company policy: speak to *Acorn User* before thinking.
Brian Long: we're getting better and better.
David Bell: a processor in the hand is worth two in a catalogue.
'Marv' Gilbert: time to get a new set of diodes for my left side.
Bob Coates: wear more than one shirt at all times.
John Horton: keep out of the Abuser's Diary.
Jeff Tansley: get into the Abuser's Diary.

Et al

Beebug: form a user group.
Watford: only 10 new releases a month.
Computer Concepts: think before speaking.

Acorn User

Bruce: to rub in the pigeon droppings harder.
Mad Alex: stop writing books.
Tony: to get a new job.
Acorn Abuser: tell the facts, the whole facts and nothing but the facts (according to Orson).

Micronet gets in a tangle

The farce with Micronet continues. First readers can't find our software. Then we get a page number which is wrong. Then Micronet doesn't have a double-sided BBC drive, so can't put our software up anyway. Next we get a page number (60043765) which has *Acorn User* on it, but no software. Apologies, and the message is: pester Micronet.

The other side of the Street

The poor people at Mirrorsoft were absolutely chuffed with themselves at the recent private press showing of their *Fleet Street Editor* package, which allows you to output your own newspapers.

But things are not all rosy. For one thing they've got a lot of Wangs around the place, and secondly the big boss Cap'n Bob Maxwell is not a happy man.

That's because they've got to move out of Maxwell House, and Cap'n Bob doesn't like losing a name like that.

And then, horror of horrors, he'll no longer be working in Worship Street, which suits him right down to the ground.

Abuse in brief

● Our poor old columnist The Man from Uncle wasn't happy this month. He sent us a whole column devoted to how badly we've treated him, how he got beaten up by Acornsoft thuggies at the Summer Show, didn't get invited to the Christmas Show and how the only good thing about this Christmas was that no-one had tried to sell him a robot. You can read his diatripe on page . . . er . . . um . . . Sorry Uncle.

(PS This magazine is strictly cash on publication.)

● To Bruce's friend in Hendon: it's definitely not twins, but thanks for the name suggestions. However, Romulus and Ramulus don't quite fit.

● Watford Electronics, after three years of trying and having a hard time with Acorn, has finally been approved as a BBC micro dealer. Will Nazir now change his two-tone green Roller for an Acorn green one? We shall have to wait and see.

● Did you see that self-pontificating editorial in *Beebug* about them reckoning there was no room for a second Christmas show and so they weren't going to support it? Since when have they given two hoots about users?

If you're going to allow that sort of thing to be said Mr Williams, at least back it up with something approaching the real reasons and not a load of pompous 'we're where it's at' blurb.

● The Electron is finally coming into its own. For £99, and even £50 in some places, it's fantastic value. Expect to see a lot of them turning up as viewdata terminals with Winchesters on the back.

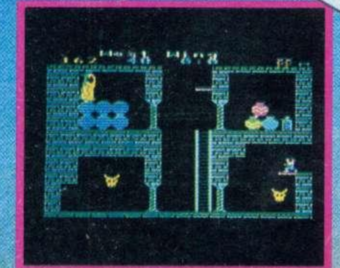


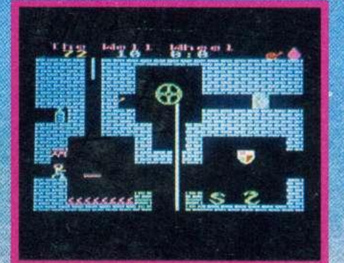
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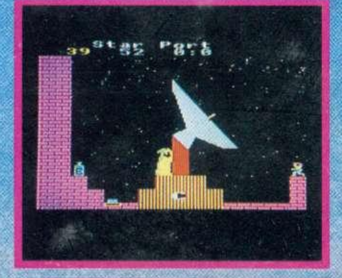
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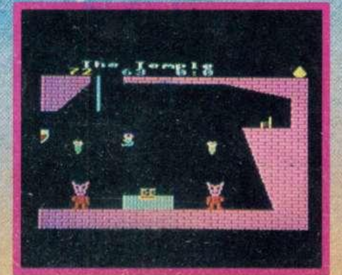
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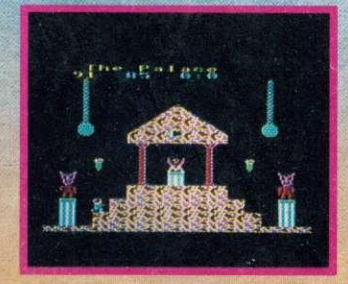
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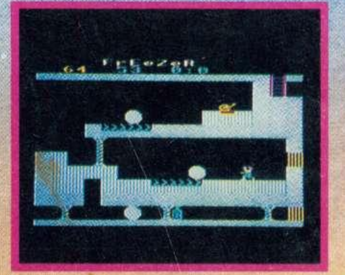
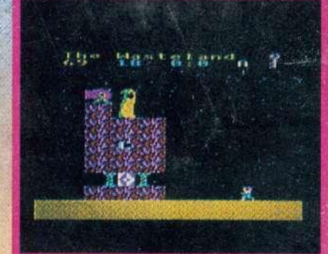


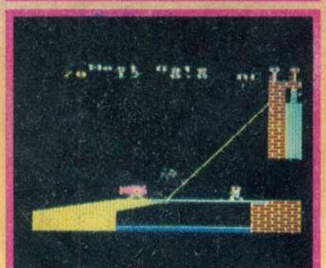
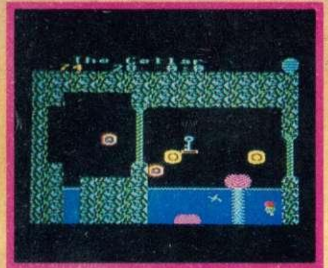


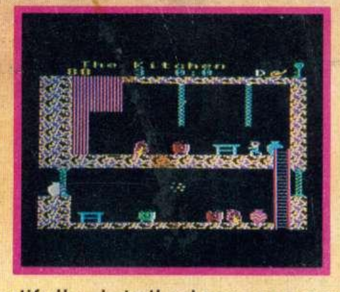


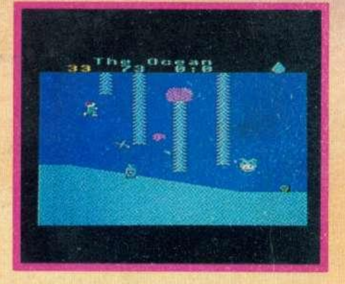








ACORN ELECTRON

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